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MOBILITY AND SUBSISTENCE-SETTLEMENT: AN ARCHAEOLOGICAL EXAMPLE FROM THE CENTRAL CANADIAN ARCTIC

BY

(C)

JAMES MICHAEL SAVELLE

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE
OF DOCTOR OF PHILOSOPHY

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FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled Mobility and Subsistence-Settlement: An Archaeological Example From the Central Canadian Arctic submitted by James Michael Savelle in partial fulfilment of the requirements for the degree of Doctor of Philosophy.

Charles Schweger
(Supervisor)

C J MacKinnon

Michael

Date: Dec. 7, 1985

ABSTRACT

Hunter-gatherer subsistence-settlement systems are considered in terms of two contrasting but complimentary mobility strategies: residential and logistical. High residential and low logistical mobility is characteristically associated with foraging subsistence settlement systems, while high logistical and low residential mobility is characteristically associated with collecting systems. The relative degree to which any given hunter-gatherer system adopts these two mobility strategies is suggested to be related primarily to the resource procurement schedule which, utilizing models developed through optimal foraging and game theory, is in turn suggested to be directly related to the nature of the resource base given a requisite technology. Specifically, collecting systems will be favoured when there is a potential for a disproportionately higher return of one or a few resources, typically accompanied by storage. Foraging systems, on the other hand, will be favoured when a wider number of 'lower return' resources are available.

The archaeological and historical record of the central Canadian Arctic (Somerset Island, Boothia Peninsula, King William Island/Adelaide Peninsula) is used as an empirical test case for the suggested relationships between resource structure and subsistence-settlement systems. Deteriorating climatic conditions beginning approximately 800 years B.P. and culminating in the 'little ice age' from approximately 400-100 years B.P. apparently considerably reduced the distribution, abundance and/or predictability of the two major resources potentially providing disproportionately greater returns;

bowhead whales in the north of the study area (Somerset Island) and barren ground caribou in the south of the study area (Boothia Peninsula and King William Island/Adelaide Peninsula). Accordingly, the hypothesis is advanced that prehistoric Thule Eskimo subsistence-settlement systems will reflect collecting strategies prior to the major cooling trend and foraging strategies (as alternate resources are incorporated in the resource procurement schedule) during the cooling trend up to the early Historic period (19th Century).

In addition to changes resulting from climatic deterioration, the potential resource base can also be considered to change with respect to technological change. In the study area the introduction of the rifle beginning approximately 1923 significantly increased the ability of hunters to acquire large numbers of caribou within a given time period at a given location. Accordingly, a second hypothesis is advanced that Historic Netsilik Inuit subsistence-settlement systems will reflect foraging strategies prior to the introduction of the rifle, and collecting strategies following the introduction of the rifle.

Archaeological correlates of collecting and foraging subsistence-settlement systems are subsequently defined and a total of ten propositions (test implications) relating these correlates to each of the two hypotheses are then tested, utilizing data obtained during archaeological investigations in the central Canadian Arctic in 1980, 1981 and 1982.

The results of the test implications relating to the first hypothesis, that dealing with climate/resource base change, suggests that there was indeed a definite shift from predominantly collecting to predominantly foraging strategies in the northern whale area and in one of the two survey regions in the southern caribou area (King William Island/Adelaide Peninsula). However, no such change occurred in a second survey region in the southern caribou area at Lord Mayor Bay/Netsilik Lake on Boothia Peninsula, where instead, foraging strategies predominated during both the warm and cool periods. Failure of the hypothesis to successfully predict a shift from a collecting to a foraging strategy in this latter region can be attributed to the apparent relative unpredictability of caribou at fall crossing locations relative to that of caribou on King William Island/Adelaide Peninsula and of bowhead whales along the coast of Somerset Island.

Results of the test implications relating to the second hypothesis, that dealing with the introduction of the rifle, indicates that while Netsilik Inuit strategies took on some characteristics of a collecting subsistence-settlement system following the introduction of the rifle, in several important aspects, in particular diet breadth, the system maintained its foraging emphasis. It is suggested that the predicted shift to a collecting strategy did in fact take place, but was short-lived (perhaps less than ten years) due to the extremely rapid decimation of caribou herds following the introduction of the rifle.

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TABLE OF CONTENTS

CHAPTER Page

1. INTRODUCTION 1

Theoretical Approach 1

Model Structure 6

Resource Use Schedule 10

Settlement Location and Demographic Patterns 21

Summary of Model and Hypothesis Formulation 25

2. BACKGROUND TO THE STUDY 30

Study Area 30

Resources 32
    Terrestrial Subsystem 32
    Marine Subsystem 34
    Freshwater Subsystem 39

History of Climatic Change 40

Effects of Climatic Change on the Resource Base 40
    Terrestrial Subsystem 40
    Marine Subsystem 42
    Freshwater Subsystem 43
    Summary 44

Sociocultural Background 46
    Prehistory 46
    History Since Contact 50

Problems and Hypotheses 54

3. ARCHAEOLOGICAL CONSIDERATIONS 57

Archaeological Correlates of Collecting and Foraging Systems 63

Site Specific Correlates 64
    Feature and Site Type 64
    Site Size 66
    Site Location 67
    Internal Site Arrangement 68
    Ecofact Characteristics 71

Page
Palimpsest Correlates 73
Test Implications 75
Hypothesis 1 78
Hypothesis 2 80

4. METHODOLOGICAL CONSIDERATIONS 83
Feature and Site Type 84
Site Size 95
Intersite Variability 98
Internal Site Structure 99
Site Situation and Intersite Association 101
Site Seasonality 104
Diet Breadth 107
Culling 109
Site Age 110

5. FIELD METHODS AND SCHEDULE 113
Regional Level 113
Site Level 124

6. ASSIGNMENT OF AGE AND CULTURAL AFFILIATION 130
Feature Type 130
Artifact Type 134
European Material 137
Lichen Characteristics 138

7. SURVEY RESULTS AND SITE SUMMARIES 145

8. HYPOTHESIS 1: TEST IMPLICATION RESULTS 184
Test Implication 1 185

Page

Test Implication 2 196

Test Implication 3 196

Test Implication 4 218

Test Implication 5 220

Test Implication 6 224

Test Implication 7 244

Test Implication 8 258

Test Implication 9 278

Test Implication 10 284

9. HYPOTHESIS 2: TEST IMPLICATION RESULTS 287

Test Implication 1 287

Test Implication 2 288

Test Implication 3 297

Test Implication 4 298

Test Implication 5 298

Test Implication 6 301

Test Implication 7 302

Test Implication 8 302

Test Implication 9 310

Test Implication 10 312

10. SUMMARY OF RESULTS AND MODEL EVALUATION 314

Hypothesis 1 314

Hypothesis 2 319

Implications for Arctic Archaeology 323

REFERENCES 327

LIST OF TABLES

Table	Description	Page
1.	Summary of the effects of climatic change on habitat and resources in the study area.	45
2.	Previous archaeological investigations in the study area.	47
3.	Expeditions to the Netsilik area prior to 1923.	51
4.	Radiocarbon dates for early and late Classic Thule semisubterranean dwellings.	132
5.	Site data summary - Creswell Bay.	153
6.	Site data summary - Aston Bay.	156
7.	Site data summary - King William Island.	158
8.	Site data summary - Adelaide Peninsula.	162
9.	Site data summary - Lord Mayor Bay.	163
10.	Site data summary - Netsilik Lake.	168
11.	Summary of bowhead whale elements at Creswell Bay and Aston Bay, Somerset Island.	260
12.	Summary of fauna MNI from excavated and/or tested Classic Thule semisubterranean dwelling sites.	273
13.	Summary of fauna MNI from excavated Modified Thule/early historic sites.	274
14.	Summary of fauna MNI from excavated late Historic sites.	309
15.	Summary of results of Hypothesis No. 1 test implications.	315
16.	Summary of results of Hypothesis No. 2 test implications.	321

LIST OF FIGURES

Page

1. Characterization of a foraging subsistence-settlement system. 8

2. Characterization of a collector subsistence-settlement system. 9

3. Optimal diet breadth model. 13

4. Effects of storage on resource utlization. 16

5. Effects of storage on diet breadth. 18

6. Average payoff function. 19

7. Effects of resource characteristics on group size and dispersion according to optimal foraging theory. 22

8. a) and b) Effects of equal and disproportionate returns on settlement and demographic patterns. 24

9. Location of the study area in the central Canadian Arctic. 31

10. Areas of major bowhead whale concentrations in the study area based on historical documents and recent observations. 37

11. Summary of major episodes of environmental change in the eastern Canadian Arctic and Greenland during the last 2000 years. 41

12. a) Colonization of the Netsilik area as suggested by proponents of the Parry Channel route with initial colonization (a) and subsequent expansion (b). b) Colonization of the Netsilik area as suggested by proponents of the Arctic mainland coast route, with approximately contemporaneous colonization with northern areas. 49

13. Distribution of local bands in the study area. 52

14. Idealized patterns of economic zones associated with (a) foraging systems and (b) collecting systems. 69

15. a) Relationship between percentage of contemporaneous feature use and number of utilization episodes and b) Relationship between site size and number of utilization episodes. 74

Page

16. Differences in overall site variability between collecting and foraging systems. 76

17. Tareumiut Eskimo semisubterranean dwelling. 85

18. Distribution of artifacts and faunal remains associated with snow dwelling I2 at the Union River, Somerset Island. 89

19. Plan of structural remains of two Netsilik Inuit tents erected and dismantled at Sheriff Harbour, Lord Mayor Bay in August 1831. 91

20. Idealized hierarchy of site morphology. 100

21. The Tareumiut site of Utkeavik, circa. 1895. 102

22. The Hadza site of Ugulu as recorded by Woodburn in October 1959. 103

23. Settlement and hunting patterns of an Inuit group during a one week period in August 1981 in the Thom Bay region of Lord Mayor Bay. 105

24. Comparison of biomass contribution of a given number of species to foraging and collecting strategy diets. 108

25. Survey regions in the study area. 116

26. Survey routes and major resources in the Creswell Bay area. 118

27. Survey routes and major resources in the Aston Bay area. 119

28. Survey routes and major resources in the King William Island area. 120

29. Survey routes and major resources in the Adelaide Peninsula area. 121

30. Survey routes and major resources in the Lord Mayor Bay area. 122

31. Survey routes and major resources in the Netsilik Lake area. 123

32. Distribution of caribou elements (as percent MNI per area) according to activity area for two historic snow dwelling features excavated at the Union River, Creswell Bay. 127

Page

33. Distribution of seal elements (as percent MNI per area) according to activity area for two historic snow dwelling features excavated at the Union River, Creswell Bay. 128

34. Degree of lichen cover on various substrate types in features in the Creswell Bay, Aston Bay, and neighbouring areas. 143

35. Degree of lichen cover on various substrate types in features in the King William Island-Adelaide Peninsula and Lord Mayor Bay-Netsilik Lake areas. 144

36. Location of sites recorded in the Creswell Bay area. 147

37. Location of sites recorded in the Aston Bay area. 148

38. Location of sites recorded in the King William Island area. 149

39. Location of sites recorded in the Adelaide Peninsula area. 150

40. Location of sites recorded in the Lord Mayor Bay area. 151

41. Location of sites recorded in the Netsilik Lake area. 152

42. Early Classic Thule site characteristics, Creswell Bay. 170

43. Late Classic Thule site characteristics, Aston Bay. 171

44. Classic Thule site characteristics, King William Island. 172

45. Modified Thule-early Historic site characteristics, King William Island. 173

46. Late Historic site characteristics King William Island. 174

47. Classic Thule site characteristics, Adelaide Peninsula. 175

48. Modified Thule-early Historic site characteristics, Adelaide Peninsula. 176

Page

49. Late Historic site characteristics, Adelaide Peninsula. 177

50. Classic Thule site characteristics, Lord Mayor Bay. 178

51. Modified Thule-early Historic site characteristics, Lord Mayor Bay. 179

52. Late Historic site characteristics, Lord Mayor Bay. 180

53. Classic Thule site characteristics, Netsilik Lake. 181

54. Modified Thule-early Historic site characteristics, Netsilik Lake. 182

55. Late Historic site characteristics, Netsilik Lake. 183

56. Comparison of early Classic Thule (Creswell Bay) and late Classic Thule (Aston Bay) site/component type frequencies in the Somerset Island area. 187

57. Comparison of Classic Thule and Modified Thule-early Historic site/component type frequencies in the King William Island-Adelaide Peninsula area. 188

58. Comparison of Classic Thule and Modified Thule-early Historic site/component type frequencies in the Lord Mayor Bay-Netsilik Lake area. 189

59. Comparison of frequencies of early Classic Thule (Cresswell Bay) and late Classic Thule (Aston Bay) tent ring sites/components according to number of tent rings in the Somerset Island area. 190

60. Comparison of frequencies of Classic Thule and Modified Thule-early Historic tent ring sites/components according to number of tent rings in the King William Island-Adelaide Peninsula area. 191

61. Comparison of frequencies of Classic Thule and Modified Thule-early Historic tent ring sites/components according to number of tent rings in the Lord Mayor Bay-Netsilik Lake area. 192

62. Comparison of frequencies of early Classic Thule (Creswell Bay) and late Classic Thule (Aston Bay) cache sites/components according to number of caches in the Somerset Island area. 193

Page

63. Comparison of frequencies of Classic Thule and Modified Thule-early Historic cache sites/components according to number of caches in the King William Island-Adelaide Peninsula area. 194

64. Comparison of frequencies of Classic Thule and Modified Thule-early Historic cache sites/components according to number of caches in the Lord Mayor Bay-Netsilik Lake area. 195

65. Comparison of average proportion of caches/tent rings according to number of tent rings for early Classic Thule (Creswell Bay) and late Classic Thule (Aston Bay) sites in the Somerset Island area. 197

66. Comparison of average proportion of caches/tent rings according to number of tent rings for Classic Thule and Modified Thule-early Historic sites in the King William Island-Adelaide Peninsula area. 198

67. Comparison of average proportion of caches/tent rings according to number of tent rings for Classic Thule and Modified Thule-early Historic sites in the Lord Mayor Bay-Netsilik Lake area. 199

68. Foraging zones associated with early Classic Thule tent ring residential sites, Creswell Bay, Somerset Island. 202

69. Foraging zones associated with late Classic Thule tent ring residential sites, Aston Bay, Somerset Island. 203

70. Foraging zones associated with Classic Thule tent ring residential sites, King William island. 204

71. Foraging zones associated with Modified Thule-early Historic tent ring residential sites, King William Island. 205

72. Foraging zones associated with Classic Thule tent ring residential sites, Lord Mayor Bay. 207

73. Foraging zones associated with Modified Thule-early Historic tent ring residential sites, Lord Mayor Bay. 208

74. Foraging and logistical zones associated with early Classic Thule semisubterranean dwelling residential sites, Creswell Bay, Somerset Island. 209

Page

75. Foraging zones associated with late Classic Thule semisubterranean dwelling residential sites, Aston Bay, Somerset Island. 211

76. Foraging and logistical zones associated with Classic Thule semisubterranean dwelling residential sites, King William Island. 213

77. Foraging zones associated with Classic Thule residential semisubterranean dwelling sites, Sherman Inlet. 214

78. Foraging zones associated with Classic Thule semisubterranean dwelling sites, Lord Mayor Bay. 215

79. Foraging zones associated with Classic Thule semisubterranean dwelling sites, Netsilik Lake. 216

80. Locations of early Historic Netsilik residential sites during the winter and spring of 1829-30 as described by Ross 1835:243-375, with associated foraging zones. 217

81. 'Heavy' early Historic tent ring excavated at site 82-24 in the Netsilik lake area. 222

82. Number of caches within a 2 km radius of early and late Classic semisubterranean dwelling sites/components according to number of dwellings. 223

83. Sketch map of semisubterranean dwellings at the early Classic Thule site 80-58, Creswell Bay. 225

84. Sketch map of semisubterranean dwellings at the early Classic Thule site 80-86 (Creswell Bay). 226

85. Sketch map of semisubterranean dwellings at the early Classic Thule site of 80-96 (Creswell Bay). 227

86. Sketch map of semisubterranean dwellings at the early Classic Thule site of 80-111 (Creswell Bay). 228

87. Sketch map of semisubterranean dwellings at the early Classic Thule site PeJq-1, northern Creswell Bay. 229

88. Sketch map of semisubterranean dwellings at the Classic Thule site of PeJr-1, northern Creswell Bay. 230

Page

89. Sketch map of late Classic Thule qarmang at PeJr-2, northern Creswell Bay. 231

90. Sketch map of semisubterranean dwellings at the late Classic Thule sites a) 80-126 and b)80-130, Aston Bay. 232

91. Sketch map of semisubterranean dwellings at the late Classic Thule sites a) 80-134, b) 80-136, and c) 80-149, Aston Bay. 233

92. Sketch map of semisubterranean dwellings at the early and late Classic Thule site 81-61 (Malerualik), King William Island. 234

93. Sketch map of semisubterranean dwellings at the early and late Classic Thule site 82-11, Sherman Inlet. 235

94. Sketch map of semisubterranean dwellings at the late Classic Thule sites a) 81-4, and b) 81-5, King William Island. 236

95. Sketch map of semisubterranean dwellings at the late Classic Thule sites a) 81-52, and b) 81-54, King William Island. 237

96. Sketch map of semisubterranean dwellings at the late Classic Thule site 81-73, King William Island. 238

97. Sketch map of semisubterranean dwellings at the a) early Classic Thule site 81-80, and b) late Classic Thule site 81-85, both in the Lord Mayor Bay area. 239

98. Sketch map of semisubterranean dwellings at the late Classic Thule site 82-17, Netsilik Lake. 240

99. Sketch map of semisubterranean dwellings at the late Classic Thule sites a) 82-16, and b) 82-23, Netsilik Lake. 241

100. Summary of internal structure of the various semisubterranean sites illustrated in Figures 83-99: a) Creswell Bay-Aston Bay; b) King William Island-Adelaide Peninsula; c) Lord Mayor Bay-Netsilik Lake. 242

101. Sketch map of snow dwelling sites in the Netsilik Lake area. 245

Page

102. Sketch map of features at the Classic Thule site 82-11, Sherman Inlet. 246

103. Sketch map of features at the Classic Thule site 81-61, King William Island. 247

104. Sketch map of features at the predominantly early Historic site 82-24, Netsilik Lake. 248

105. Comparison of frequencies of early Classic Thule and late Classic Thule semisubterranean dwelling sites/components according to number of dwellings in the Somerset Island area. 250

106. Comparison of frequencies of early Classic Thule (Creswell Bay) and late Classic Thule (Aston Bay) residential tent ring sites/components according to number of tent rings in the Somerset Island area. 251

107. Comparison of frequencies of early Classic Thule and late Classic Thule semisubterranean dwelling sites/components according to number of dwellings in the King William Island-Adelaide Peninsula. 252

108. Comparison of frequencies of Classic Thule and Modified Thule-early Historic residential tent ring sites/components according to number of tent rings in the King William Island area. 253

109. Comparison of early Classic Thule and late Classic Thule semisubterranean dwelling site/component frequencies according to site/component size in the Lord Mayor Bay-Netsilik Lake area. 254

110. Comparison of Classic Thule and Modified Thule-early Historic residential tent ring site/component frequencies according to site/component size, in the Lord Mayor Bay-Netsilik Lake area. 255

111. Population estimates for early and late Classic Thule sites in the study area, and comparison with historic population estimates. 257

112. Comparison of relative bowhead whale bone elements frequencies (as percent MNI) from semisubterranean dwelling sites and bowhead whale processing locations (data from McCartney 1978, 1979a and this study). 267

Page

113. Comparison of the proportion of bowhead whale MNI/semisubterranean dwelling number for early and late Classic Thule sites in the Somerset Island area. 270

114. Percent contribution by weight to diet of species represented in trench 7 excavation at PeJr-1. 271

115. Percent contribution by weight to diet of species represented at a) the early Classic Thule site 82-11 at Sherman Inlet, and the late Classic Thule sites a) 81-52, b) 81-61, and both on King William Island. 275

116. Percent contribution by weight to diet of species represented at the early Classic Thule site 81-80; a) dwelling, b) test pits and c) the late Classic Thule site 82-17. 276

117. Percent Contribution by weight to diet of fauna represented at the early Historic sites a)82-24, 'heavy' tent ring, b) 82-57, four tent rings, c) 82-48, three snow dwelling scatters, d) 82-70, 3 tent rings, e) 82-50, two tent rings, f) 82-21, one tent ring, and g) 82-22, two tent rings. 277

118. Relative elemental abundances for caribou from complete dwelling and midden excavations at the early Classic Thule component at site 82-11 at Sherman Inlet and the late Classic Thule component at site 81-61 on King William Island. 279

119. Relative elemental abundances for caribou from complete dwelling and midden excavations at the early Classic Thule component at site 81-80 in the Lord Mayor Bay area, the late Classic Thule site 82-17, and the early Historic site 82-24, both in the Netsilik Lake area. 280

120. Relative elemental abundances for caribou from two caches excavated at the Classic Thule component at site 81-61, King William Island. 282

121. Relative elemental abundances for caribou from a Modified Thule-early Historic cache excavated at site 81-26, King William Island, and an early Historic cache excavated at site 82-24, Netsilik Lake. 283

Page

122. Summary of results of cementum analysis of caribou teeth. 285

123. Summary of results of cementum and dentine analysis of ringed seal teeth. 286

124. Comparison of Modified Thule-early Historic and late Historic site/component type frequencies in the King William Island-Adelaide Peninsula area. 289

125. Comparison of Modified Thule-early Historic and late Historic site/component type frequencies in the Lord Mayor Bay-Netsilik Lake area. 290

126. Comparison of frequencies of Modified Thule-early Historic and late Historic tent ring sites/components according to number of tent rings in the King William Island-Adelaide Peninsula region. 291

127. Comparison of frequencies of Modified Thule-early Historic and late Historic tent ring sites/components according to number of tent rings in the Lord Mayor Bay-Netsilik Lake region. 292

128. Comparison of frequencies of Modified Thule-early Historic and late Historic cache site/components according to number of caches in the King William Island-Adelaide Peninsula area. 293

129. Comparison of frequencies of Modified Thule-early Historic and late Historic cache sites/components in the Lord Mayor Bay-Netsilik Lake area. 294

130. Comparison of average proportion of caches/tent rings according to number of tent rings for Modified Thule-early Historic and late Historic sites in the King William Island-Adelaide Peninsula area. 295

131. Comparison of average proportion of caches/tent rings according to number of tent rings for Modified Thule-early Historic and late Historic sites in the Lord Mayor Bay-Netsilik Lake area. 296

132. Foraging zones associated with late Historic residential tent rings sites in the King William Island area. 299

Page

133. Foraging zones associated with late Historic residential tent ring sites in the Lord Mayor Bay area. 300

134. Sketch map of snow dwelling feature remains at the late Historic sites a) 81-45 and b) 82-47. 303

135. Sketch map of late Historic site 81-80, Lord Mayor Bay area. 304

136. Comparison of frequencies of Modified Thule-early Historic and late Historic residential tent ring sites/components in the King William Island-Adelaide Peninsula area. 305

137. Comparison of frequencies of Modified Thule-early Historic and late Historic residential tent ring sites/components in the Lord Mayor Bay-Netsilik Lake area. 306

138. Percent contribution by weight to diet of fauna represented at the late Historic sites of a) 81-81, two fall *qarmang*, b) 82-45, two snow dwelling scatters, c) 82-17a, one tent ring, and d) 82-19, one tent ring; all in the Lord Mayor Bay-Netsilik Lake area. 308

139. Relative elemental abundances for caribou from the early Historic sites of a) 82-24, and the late Historic sites of b) 82-17a and c) 81-81, all in the Lord Mayor Bay-Netsilik Lake area. 311

LIST OF PLATES

Plate 1

Page

a) Ringed seals at the present residential camp of Kuvinaluk, Union River, Somerset Island. July 1980.

b) Processing caribou at a kill site in the Thom Bay Region of Lord Mayor Bay, Boothia Peninsula. August 1981. 370

Plate 2

a) Steatite quarry, Lord Mayor Bay (Site 82-35) utilized at least during late Historic and Recent times.

b) Remains of a DC-3 that crashed on northern Boothia Peninsula in 1947. 372

Plate 3

a) Remains of a beluga whale at a processing site near Kuvinaluk, Union River, Somerset Island. July 1980.

b) Stone fish weir on the Stanley River near Thom Bay in the Lord Mayor Bay areas of Boothia Peninsula. August 1981. 374

Plate 4

a) Constructing fish weir on the Stanley River near Thom Bay in the Lord Mayor Bay area of Boothia Peninsula. August 1981.

b) Location of fish weir shown in Plates 3b and 4a approximately one year later. August 1982. 376

Plate 5

a) Caribou observation site near Thom Bay in the Lord Mayor Bay area of Boothia Peninsula. August 1981.

b) Above-ground stone cache containing 29 Arctic char prior to the final covering stone layer. August 1981. 378

Plate 6

a) Above-ground cache of caribou at Sherman Inlet, Adelaide Peninsula. July 1982.

b) Large tent ring at Classic Thule residential site 80-107 near Creswell Bay, Somerset Island. 380

Plate 7 Page

a) 'Heavy' semisubterranean stone/sod/whale bone dwelling at site 80-86, Creswell Bay, Somerset Island.

b) 'Light' semisubterranean stone/sod dwelling at site 81-52, King William Island. 382

Plate 8

a) Remains of gravel sleeping platform insulation layer and artifacts and faunal remains associated with snow dwelling at site 82-45, Felix Harbour, Lord Mayor Bay.

b) Semisubterranean dwelling interpreted as a possible karigi at site 80-93, Creswell Bay, Somerset Island. 384

Plate 9

a) 'Heavy' semisubterranean dwelling interpreted as possible karigi at site 82-11, Sherman Inlet, Adelaide Peninsula.

b) Circular ring of ten bowhead whale crania at site 80-86, Creswell Bay, Somerset Island. 386

Plate 10

a) Bowhead whale crania (Site 80-53) showing artificial perforations immediately anterior of the foramen magnum. Creswell Bay, Somerset Island.

b) Caribou drive system consisting of intricate fence-corral network, site 82-12, Sherman Inlet, Adelaide Peninsula. 388

Plate 11

a) Circular gravel caches, Creswell Bay, Somerset Island (Site 80-92).

b) Part of the remains of the Victory's engine (Site 80-51), abandoned in 1830 at Felix Harbour, Lord Mayor Bay, Boothia Peninsula. 390

Plate 12 Page

a) Inuit canvas tent and the field crew's tent at the mouth of the Stanley River in the Lord Mayor Bay area, Boothia Peninsula. August 1981.

b) Cached seal in cache constructed of tent "hold-down" stones at the original tent location and immediately following the dismantling of the tent. August 1981. 392

CHAPTER ONE:

INTRODUCTION

Central to much of recent anthropological and archaeological research is the investigation of the relationship between hunter-gatherer settlement systems and the resource structure of the natural environment. Most studies of such man-land relationships have typically concentrated upon such aspects as socioterritorial organization (e.g. Helm 1968; Damas 1969a, 1969b; Lee 1972; Riches 1982; Yellen and Harpending 1972), settlement location (e.g. Crumley 1979; Roper 1979; Vita-Finzi and Higgs 1970; Williams *et al.* 1973; Wood 1978) and settlement spacing (Harpending and Davis 1978; Wilmsen 1973). While the present study of necessity addresses these concerns, its primary focus is to determine how hunter-gatherer mobility strategies articulate with the resource structure to shape settlement systems. Accordingly, a model of mobility strategies is first developed, and a series of hypotheses relating these strategies to environmental characteristics is presented. These hypotheses are then tested using empirical data; in this case, the archaeological record of the past approximately one thousand years from the south-central Canadian Arctic archipelago.

Theoretical Approach

The general theoretical perspective guiding the present research is that of cultural ecology - the concept that cultural processes and systems can be understood in terms of a complex interaction with the environment.

Environmental explanations for human behavior have been commonplace for centuries, especially in Western thought. Hippocrates, Plato, and Aristotle, for example, each discussed the role of the physical environment in determining various aspects of human life (Hardesty 1977:1-2). The theme of environmental determinism was replaced by an orientation toward environmental possibilism as a result of the historical-particularist approach of Boas and his students in the early 20th century. According to proponents of the environmental possibilist school, environment placed stringent restrictions on the level of cultural development, but was considered irrelevant in explaining the origins of cultures or particular cultural traits. The most commonly cited example of this approach is the study by Kroeber (1939) in which the strong correlation between similar cultures and similar environments suggested that

> ...cultures are rooted in nature, and can therefore never be completely understood except with reference to that piece of nature in which they occur, (however) they are no more produced by that nature than a plant is produced or caused by the soil in which it is rooted. (1939:1)

The common denominator of both the determinist and possibilist approaches is the concept that culture occupies one sphere and the environment another, and while the spheres may influence each other, each can be considered a separate entity.

Against this background, Steward's Theory of Culture Change (1955) constitutes a major step in that it is the first coherent statement of how the interaction between culture and environment should be studied in causal terms without reverting to simple determinism, which makes no provision for cultural variables, or lapsing into possibilism "...in which the recognition of the cultural factor ends in a morass of indeterminacy" (Harris 1968:667). According to Steward, the cultural-ecological approach presents both a problem and a method;

> "The problem is to ascertain whether the adjustments of human societies to their environments require particular models of behavior or whether they permit latitude for a certain range of possible behavior patterns" (1955:36)

The 'problem' was further qualified in that, while all aspects of culture were seen to be functionally interdependent, the degree and kind of interdependence was not the same for all features. The 'culture core' concept was introduced to include

> "...the constellation of features which are most closely related to subsistence activities and economic arrangements (and included) social, religious, and political patterns as are empirically determined to be closely connected to the arrangements" (1955:37).

Accordingly, the 'method' of cultural ecology involved the analysis of

1. the interrelationship between environment and exploitative or productive technology
2. the interrelationship between behavior patterns and exploitative technology, and
3. the extent to which those behavior patterns affect other sectors of culture (Steward 1955:40-41).

Using this method, Steward then went on to generate a taxonomic scheme based on various levels of socio-cultural complexity incorporating the observed variability in subsistence techniques and social organization of a number of different societies. Thus, man-land relationships were seen to represent the adaptation of cultures to specific environments.

Following Steward's pioneering work, the cultural-ecological approach was expanded to include the biological concepts of population, community, and ecosystem (e.g. Geertz 1963; Vayda and McCay 1975; Richerson 1977). This convergence of evolutionary and ecological perspectives gave rise to the notion of culture as a system linking human populations with the natural environment, thereby placing human culture in an evolutionary meaningful context. Accordingly, culture can be defined as a 'complex adaptive system' which is open internally as well as externally, such that "feedback control loops make possible not only self-regulation, but self-direction or at least adaptation to a changing environment" (Buckley 1968:490). As noted by Kirch (1980), this 'complex adaptive system' "maps" parts of the variety and constraints of its associated environment into its organization as structure and/or information, thereby registering changes in environment and selectively matching system to environment.

An underlying assumption in the examination of hunter-gatherer settlement systems as 'adaptive' systems is that the 'adaptive' behavior results from rational decisions, and that these decisions are related to security problems presented by the environment. Put another way, "since systems of adaptation are energy-capturing systems, the (adaptive behavioral) strategies they employ must bear some relation to the...structure of the environment in which they seek energy" (Binford 1980:13 emphasis in original).

Given the above characteristics of a cultural-ecological perspective, hunter-gatherer mobility patterns can be examined on the premises that a) they can best be considered in terms of their interaction with the environment, b) the resulting relationships can be considered adaptive in that they serve as problem-solving devices, these problems being determined by the natural environment, and c) these relationships are most profitably examined within a systemic framework. These guiding premises allow a definition of relevant variables in the study of hunter-gatherer systems while at the same time specifying concomitant variable interrelationships.

While the ecological approach has been viewed by some as a potentially powerful explanatory tool for the study of hunter-gatherer societies (see for example Binford 1962, 1964; Clarke 1968; Bennett 1976; Jochim 1979; Bettinger 1980; Hardesty 1980; Kirch 1980; Ellen 1982 for recent discussions), others have viewed it as less than adequate (e.g. Sahlins 1972; Asch 1979; Lee 1979, 1981). The shortcomings of the approach as seen by the latter group include the lack of an apparent direct articulation between ecological factors and social and ideological factors, the lack of an apparent direct culture core-technology structural interrelationship, and, perhaps most importantly, the lack of a definition of processes that explain the transformations that societies may undergo through time (cf. Lee 1979:3). These are important considerations, and it is not implied here that the cultural-ecological approach offers a complete perspective on hunter-gatherer societies. Certainly other variables such as social relationships, information networks, or technology can substantially affect or alter these relationships. However, since hunter-gatherer systems are essentially "anchored" to environments, the manner in which they adapt, or at least respond, to the environment must be given serious consideration. Accordingly, the cultural-ecological approach offers one form of an explanatory framework in terms of a body of general theory that, when compared and/or combined with complementary economic, social, and/or cognitive/symbolic theory, allows for a more comprehensive understanding of hunter-gatherer behavior.

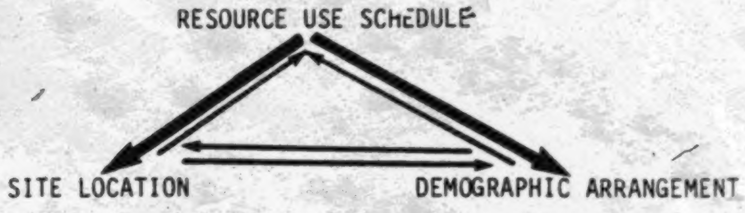
Model Structure

Mobility, as defined as a polar opposite to sedentism, has traditionally been used to describe hunter-gatherer settlement systems in terms of the temporary nature of residential sites, and in this context has often served to characterize the 'lowest' stage or level in models of evolutionary change from 'simple' to 'complex' societies (see for example Steward 1955; Sahlins and Service 1960; Service 1962; Fried 1967; Murdoch 1967). Recently, however, Binford (1980, 1982) and Kelly (1983) have distinguished between residential and logistical mobility. Residential mobility refers to the movement of all members of a residential site from one location to another, while logistical mobility refers to the movement of individuals or small groups on temporary excursions from (and returning to) a residential site.

Binford (1980) has identified two basic hunter-gatherer system 'types' based on mobility characteristics: 'foragers' and 'collectors'. Foragers are characterized by high residential mobility and low logistical mobility. Food and other resources are typically gathered on a day to day basis, and as such food storage is relatively rare. Resources are typically gathered through an 'encounter' strategy within a 'foraging radius', and when commuting time between the residential base and the resources becomes excessive, a residential move takes place (Figure 1). This move to another foraging location will frequently be accompanied by either group fusion or group fission. Examples of typical foraging groups as identified by Binford (1980) include the Dobe!Kung as described by Lee (1968) and Yellen (1977), the G/wi San as described by Silberbauer (1972), and the Hadza as described by Woodburn (1972).

Collectors, on the other hand, are characterized by low residential mobility and high logistical mobility. Food and other resources are obtained at specific procurement locations through the efforts of specific task groups (Figure 2), and such strategies are typically accompanied by food storage. Binford (1980) identifies the Numamiut Eskimos as a typical collecting group.

Since mobility as defined here has both spatial and demographic organizational components, and since these components represent adaptations stemming from the interaction between human populations and the resources upon which they depend, the articulation of these subsystems can be modelled as follows (after Jochim 1976).



Furthermore, since the cultural-ecological approach emphasizes the greater independence and causative priority of the resource structure, an examination of underlying principles determining resource use scheduling should allow an understanding of subsequent site location

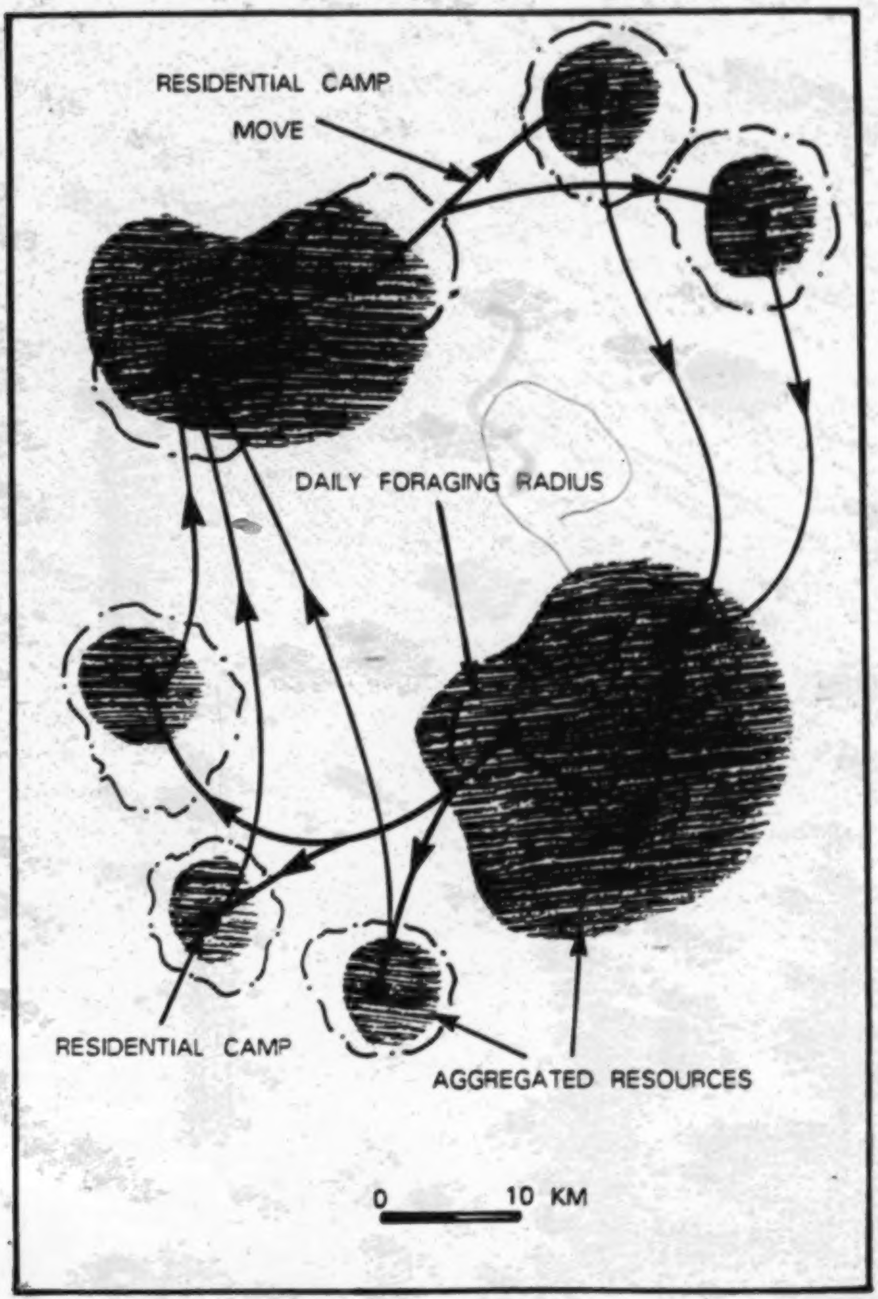

RESIDENTIAL CAMP
MOVE
DAILY FORAGING RADIUS
RESIDENTIAL CAMP
AGGREGATED RESOURCES
0
10 KM

Figure 1. Characterization of a foraging subsistence-settlement system. After Binford 1980.

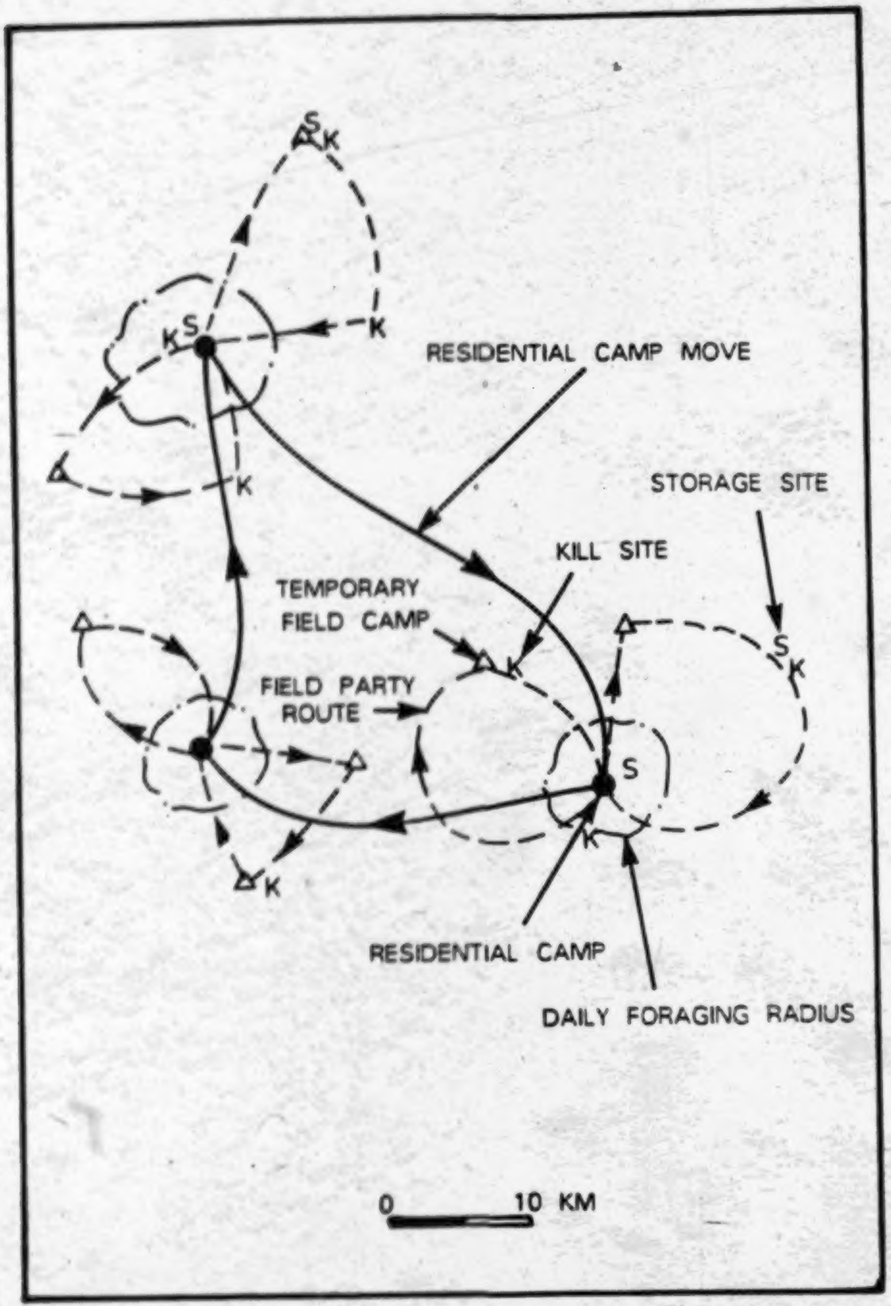

S
K
K
S
K
RESIDENTIAL CAMP MOVE
K
STORAGE SITE
KILL SITE
TEMPORARY
FIELD CAMP
K
S
K
FIELD PARTY
ROUTE
S
K
K
RESIDENTIAL CAMP
DAILY FORAGING RADIUS
0
10 KM

Figure 2. Characterization of a collecting subsistence-settlement system. After Binford 1980.

and demographic arrangements, and consequently mobility strategies.

Resource Use Schedule

Determination of underlying principles of hunter-gatherer resource use scheduling has previously relied on both informal and formal models.

The informal models have tended to approach hunter-gatherer systems through 'adaptive principles' such that a series of seemingly complex economic decisions can be seen as the result of the relatively straightforward goal of minimizing risk. For example, Gould (1977:168-170) characterized the Western Australian Desert aborigine subsistence adaptation as a strategy of 'risk minimization' with plant foods comprising the majority of the diet, and decisions regarding the alternate resources made such that the results are reasonably certain. Rogers and Black also suggest similar goals for the Weagamow Ojibwa, which include

> 1. To seek food resources chiefly at the time they are most readily and abundantly available.
>
> 2. To locate and distribute the human population (providers and consumers) in such a manner as to minimize time and energy spent on travel and transport, and regulate group size in accordance with resource availability...and the existence of appropriate habitat campsites.
>
> 3. To be ready with contingency plans that may override or supercede the rules as given above when circumstances demanded it for survival (Rogers and Black 1976:20-22).

Similarly, Flannery (1968) suggested that seasonality and scheduling problems amongst hunter-gatherers were governed by three basic principles which have been summarized by Bettinger (1980:202) as follows: 1) plant resources take precedence over animal resources,

2) when available, seasonally restricted resources take precedence over those available year round, and 3) the size of population aggregates are adjusted seasonally to reflect the local abundance of the resource.

While such ethnographically-derived informal models of risk minimization have the advantage of "simplicity and parsimonious summarization and explication" (Bettinger 1980:202), they tend to be ambiguous and are difficult to operationalize as predictive models.

Formal models of resource scheduling include optimal foraging (e.g. Perlman 1980; Winterhalder and Smith 1981; Smith 1983, 1985), economic 'goal' theory (e.g. Jochim 1976), game theory (e.g. Coombs 1980), and linear programming (e.g. Keene, 1979; Reidhead 1979).. Although there are considerable technical differences in the various models, they all share a common feature in that, as in the informal models, they account for subsistence behavior in terms of one or more simple principles that weigh the relative payoffs and costs of different economic choices in the determination of adaptive solutions, and thus resource schedules. As noted by Smith (1983) it is this stress on parsimony and logical rigor that make such models attractive. Two of the models, optimal foraging and game theory, are of particular relevance to the present study.

According to optimal foraging theory, resource use is scheduled so that maximum benefit is derived for individual survival and reproductive success. Accordingly, such models focus on the costs and benefits resulting from decisions by individual actors. Typically, this involves the identification of all potential subsistence resources and the determination of the search time (time taken to locate one unit of a resource) and pursuit time (time taken to capture and process one unit of a resource) for each resource. Generally, search time decreases with increasing density of the prey items, while pursuit time increases with larger prey items. Reliance on items with the lowest handling times will maximize harvesting efficiency, but at the same time will result in high search times. However, as additional items are added to the diet, search time will decrease (although handling time will increase). The problem is therefore to determine which items will be added to the diet such that the returns for the time spent foraging is 'optimized'. According to optimal foraging theory, this will occur at the point when decreasing search time equals increasing handling time (see Figure 3). As noted by Bettinger (1980), two important implications follow from optimal foraging models. First, the inclusion of an item in a diet is independent of its own abundance and depends only on the abundance of items with lower handling times; i.e. low-ranked items are acquired only if higher ranked items become scarce. Second, as the overall abundance of all items decreases, more items are added to the diet.

If the most important resource attributes to hunter-gatherers are assumed to be weight, density, aggregation size, and nonfood yield (cf. Jochim 1976:23), security in terms of risk minimization can be rated as follows:

$\text{security} = \frac{wnd}{m}$ where w - weight, n - nonfood yield (i.e. parts of a resource valued other than for food; e.g., hides, ivory), m - mobility

Thus, a resource will be of greater importance the greater its weight, nonfood yield, and density, and the lower its mobility level.

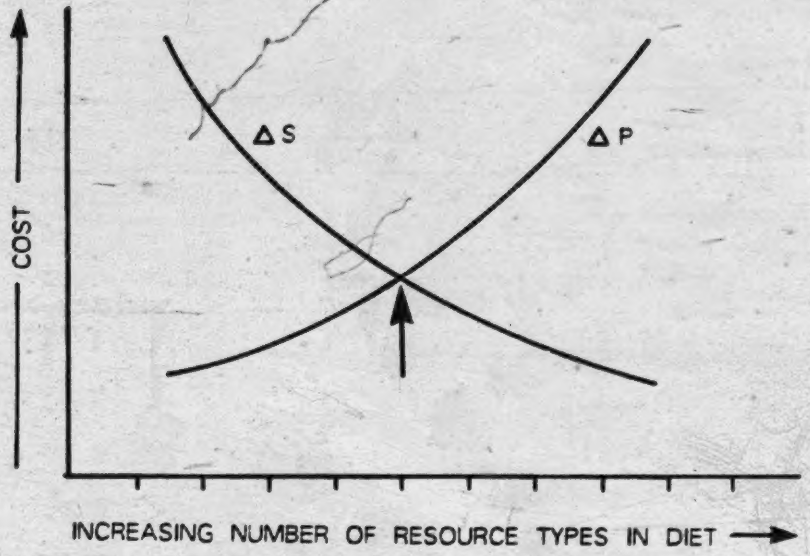


Figure 3. Optimal diet breadth model. As an increasing number of resource types are added to the diet, the △S curve plots decreasing average search costs and the △P curve increasing average pursuit costs. Cost can be either time or energy. Resources are ranked according to their value in terms of the cost-benefit measure adopted. The optimal diet breadth is represented at the intersection of the two curves. After Winterhalder 1981a.

This relationship will also determine search time, such that:

$$\text{search time} = \frac{m}{wnd}$$

Aggregation size (a), on the other hand, will determine pursuit time according to the following:

$$\text{pursuit time} = \frac{m}{wna}$$

From these relationships, it can be seen that an increase in resource mobility will increase both search and pursuit times. On the other hand, overall resource density will directly affect search time, but will have little effect on pursuit time, while an increase in resource aggregate size has the effect of decreasing pursuit time per unit weight but will have little effect on search time. The latter relationship assumes that the search cost for an aggregated resource is the same as for an individual of that resource. In reality, the predictable 'localization' of seasonal aggregates compensates for the reduced density of potential search target units (cf. Jochim 1976:27-28). Accordingly a resource will be of greater importance the greater its aggregation size, the food and nonfood yields and mobility being held constant. Groups seeking optimal solutions, therefore, will adjust resource use according to changing densities and aggregations of critical resources.

Since most environments are heterogeneous either spatially or temporally, the foraging patterns can be expected to follow a generalized strategy such that an average resource yield is maintained through a 'mixing' of resources through time. This results in a strategy of 'mapping-on' to the changing resource structure, whereby demographic and spatial characteristics of the foraging group fluctuate to maximize return rates and minimize risks (see discussion below).

The resource scheduling characteristics as described above are precisely those which would favour a 'foraging' strategy by hunter-gatherers as defined by Binford (1980). Such strategies will be appropriate when there is no spatial incongruity of resources, whether these resources are continually available or whether they are 'phased in' through a seasonal cycle. Furthermore, such groups may be considered 'generalists' in the sense that emphasis is on reducing search times through the addition of resources.

If, however, the return of a particular resource is such that a large surplus will accrue, then additional resources which would otherwise have been utilized following the harvest of the first resource will be ignored. The former resource will be utilized until the 'storage return' decreases below the minimum required return (Figure 4). At that time, additional resources will be procured such that the return rate is maintained at the minimum required level. In Figure 4, resource 'D' will be harvested from the residential location associated with resource 'A' until the potential return of a move to resource 'D' exceeds that from stored resource 'A'. At that point a residential move takes place to resource 'D'. If the return from stored resource 'A' remains above the minimum requirement level until resource 'A' again becomes available, however, then a residential move will not be required, and logistical mobility would be oriented to a) the maintenance of a minimum level from stored resource 'A', and b) the procurement of the required amounts of resource 'D' to supplement resource 'A'. Thus a storage strategy, through the reduction of

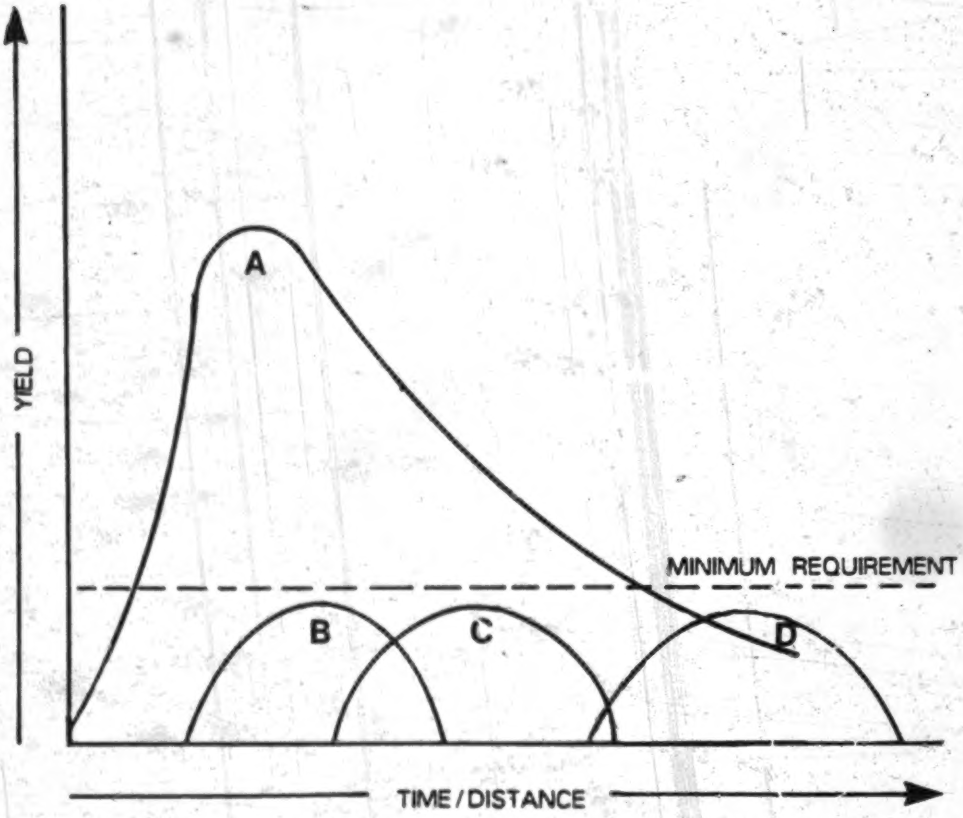


Figure 4. Effects of storage on resource utilization. As the minimum requirement is reached following decreasing returns from stored resource A, resource D is exploited.

search time (for stored resources), has the effect of decreasing diet breadth, with a resulting 'pursuit' specialization (see Figure 5).

An additional insight into the effects of the disproportionate return of one resource can be obtained by considering the resource base in the context of game theory. Game theory approaches the resource base on the premise that an individual (or group) can anticipate future conditions (i.e. the predictibility of resources), and makes the choice of a procurement schedule accordingly (Coombs 1980).

Two game theory solutions of particular importance to hunter-gatherer studies are the minimax and Bayes solutions. A minimax solution represents the mix of strategies in a given environment that guarantees a maximum return for minimum risk. As an example, Figure 6 illustrates the minimax solution in a case where two resources have the 'payoff' values as indicated according to the time alloted to the effort in searching, pursuing and capturing each of the two resources (horizontal axis) given two environmental conditions. The minimax solution (maximizing the minimum payoff) occurs at point x. The Bayes solution, on the other hand, takes into account the predictability of the environmental states and attempts to maximize average payoffs through a 'pure' strategy. While this solution is greater than a minimax solution, it can be seen that the minimum payoff is well below that of a mixed strategy. Coombs (1980:203-204) has outlined the following consequences of storage strategies in the context of game theory:

1. the greater the storage efficiency (i.e. the proportion of food produced at time Tn that a storage system can make available

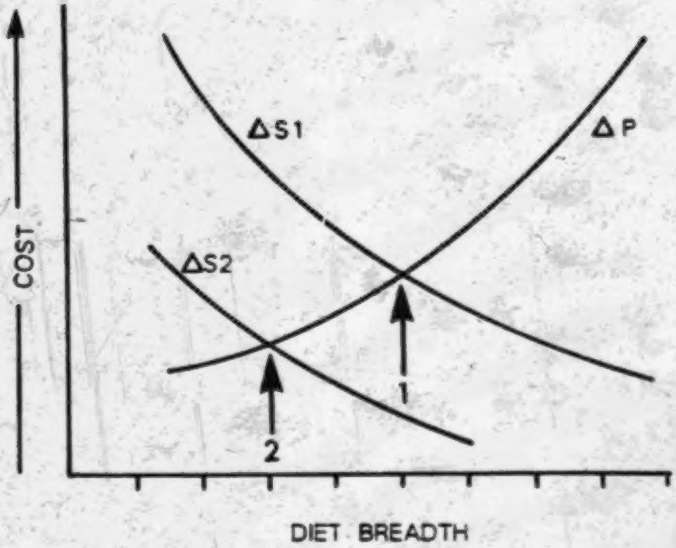

COST
DIET BREADTH
ΔS1
ΔP
ΔS2
1
2

Figure 5. Effects of storage on diet breadth. Storage decreases search time from ΔS1 to ΔS2, resulting in a shift in diet breadth toward fewer species.

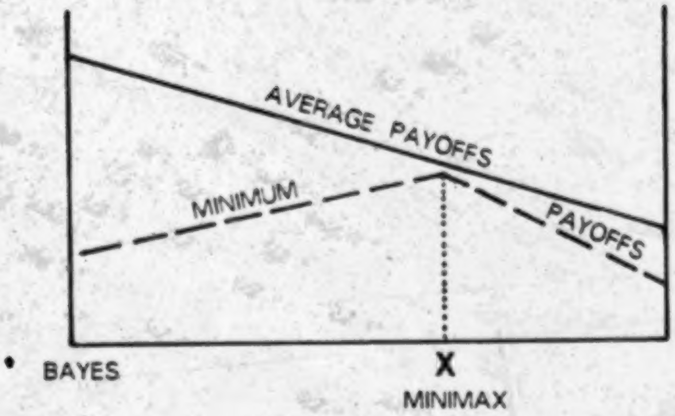


Figure 6. Average payoff function. Bayes strategy maximizes the average payoff, while a minimax strategy maximizes the minimum payoffs.

for consumption at Tn+1), the closer its strategy will approximate Bayes solution.

2. the longer the interval between optimal environmental states (as they are defined for each season), the closer a strategy will approximate minimax.
3. the more irregular an environment with respect to time (i.e. the variance in the time interval between environmental states), the closer a strategy will approximate minimax.
4. the closer the subsistence level is to the average payoff for Bayes solution, the closer a strategy should approximate Bayes solution.

If it is assumed that the density of critical items change according to environmental states (thus increasing or decreasing search times), and if it is assumed that storage efficiency (i.e. the amount of the resource stored per unit time) decreases search time, then it can be seen that game theory predicts essentially the same relationships between resource structure and resource schedule as optimal foraging. That is, as the predictability of a critical resource increases, residential mobility and diet breadth decreases and total yield (and thus total storage, assuming a storage capability) increases.

The characteristics of a storage strategy as predicted from optimal foraging and game theory are those associated with hunter-gatherers employing a 'collecting' strategy , in that emphasis is on the directed pursuit of a few specific resources. Such strategies will be appropriate when there is a) spatial or temporal incongruency of resources, b) disproportionately greater returns from one (or a few) resources, and c) the potential return of the most critical resource(s) is highly predictable.

Settlement Location and Demographic Patterns

Since resource search and procurement techniques place specific demands on social co-operation and group mobility, settlement locations and demographic arrangements can be expected to 'track' closely the resource use schedule. For foragers practicing a 'mapping-on' strategy, the model for optimal settlement patterns proposed by Horn (1968) from an analysis of colonial nesting in blackbirds is particularly instructive. The general form of the model is as follows:

$$\bar{d} = 2kt \sum_i \sum_j t(x_i y_j) \sqrt{(x_i - x_0)^2 + (y_j - y_0)^2}$$

$\bar{d}$ - average round-trip distance between a user and resource points

k - number of foraging groups per unit time

t - total time under consideration

$t(x_i, y_j)$ - proportion of time during which foraging is better at $(x_i y_j)$ than at any other point in the area

(x_0, y_0) - coordinates of user location

According to the model, evenly dispersed, stable (low mobility) resources are most efficiently procured through a strategy of small searching groups (see Figure 7 a). When resources are mobile, aggregated and unpredictable, however, a central location from which all carry out searches is most efficient (see Figure 7 b). The model makes two assumptions concerning the resource structure; 1) resources at stable, evenly dispersed points are simultaneously available, and

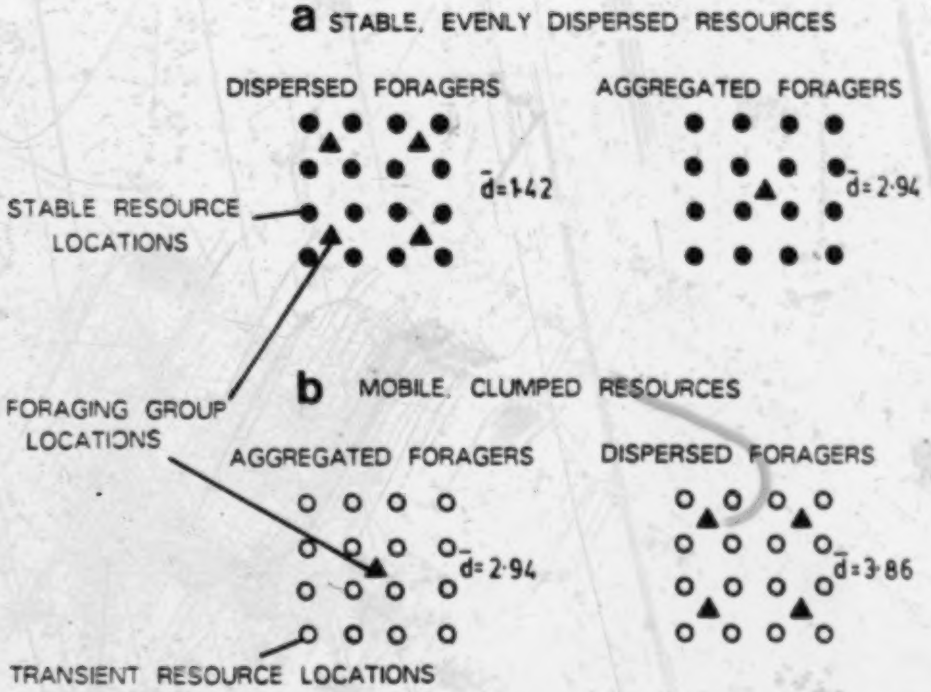

a STABLE, EVENLY DISPERSED RESOURCES
DISPERSED FORAGERS
AGGREGATED FORAGERS
d̄=1·42
d̄=2·94
STABLE RESOURCE LOCATIONS
b MOBILE, CLUMPED RESOURCES
FORAGING GROUP LOCATIONS
AGGREGATED FORAGERS
DISPERSED FORAGERS
d̄=2·94
d̄=3·86
TRANSIENT RESOURCE LOCATIONS

Figure 7. Effects of resource characteristics on group size and dispersion according to optimal foraging theory. Round-trip distance from forager to resource points determined by the probability of successfully locating resource is given by d̄. After Winterhalder 1981a.

3

2) resources at mobile, aggregated resource points are available at one, or at the most very few, of the points (see Wilmsen 1973:3; Heffley 1981:127). As applied to hunter-gatherers, foragers procuring evenly-spaced and stable resources will tend toward a strategy utilizing small, dispersed social units. Foragers procuring mobile, aggregated, unpredictable resources will tend toward a strategy utilizing one central population aggregation.

For logistically organized hunter-gatherers, Horn's optimal group size/locality model is not directly applicable. Instead, population aggregations can be expected to occur primarily in relation to cached resources. If the cached resources are evenly distributed, the optimal settlement location that will minimize logistical movements is centrally located. If, on the other hand, the cached resources are at one location, the settlement will be expected to be at or near that locality. Since most caching strategies are based on the procurement of mobile, aggregated, predictable resources, settlements can often be expected to be situated at one location on an annual basis.

The differences between the two strategies can be further illustrated by referring to the concepts of relative abundances of resources discussed previously. In Figure 8a, approximately equal returns are obtained from resources 'A' - 'D' at each of the resource points, and the settlement and demographic patterns 'track' the resources accordingly. With a disproportionate abundance of resource 'A', the group maintains a permanent residence at point 'A', while smaller task groups maintain the storage returns of resource 'A' and the additional returns (required for a minimum population maintenance) from resource 'D' (Figure 8 b).

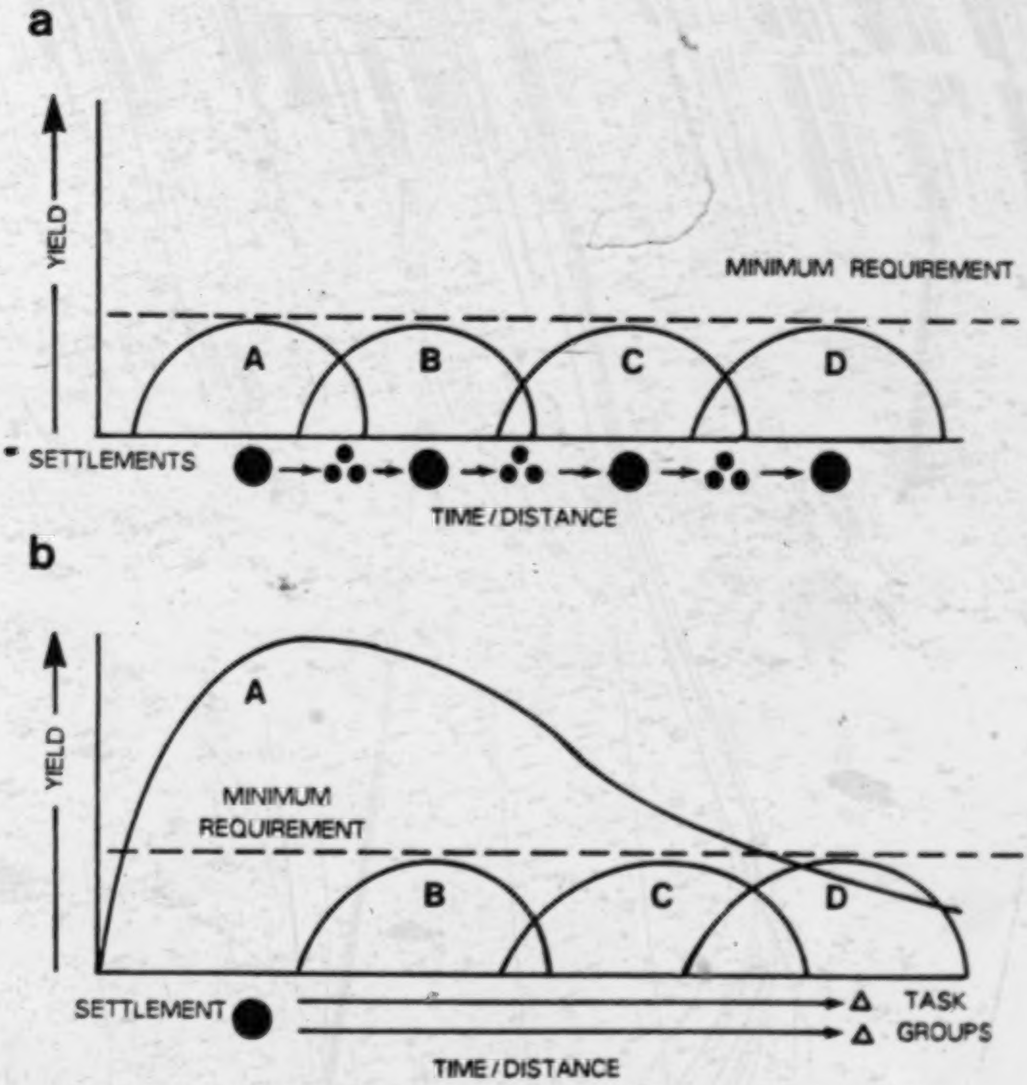

a
YIELD
MINIMUM REQUIREMENT
A
B
C
D
SETTLEMENTS
TIME / DISTANCE
b
YIELD
A
MINIMUM REQUIREMENT
B
C
D
SETTLEMENT
TASK
GROUPS
TIME / DISTANCE

Figure 8. a) Effects of approximately equal returns of a number of resources available at different times and/or localities on settlement and demographic patterns. b) Effects of disproportionate abundance of one of a series of resources on settlement and demographic patterns.

One final aspect to be considered in discussing spatial and demographic characteristics of foragers vs. collectors is the influence of each on social organization. Foraging strategies, due to their relatively simple principles regarding resource procurement (i.e. residence groups vs. foraging groups), would require, at least for resource procurement purposes, no special organizational structures. Collectors, on the other hand, due to the specialization in pursuit techniques for fewer resource types, logistically organized task groups, and stored food requiring managing and distribution, would be expected to require formal, although perhaps temporary, additional organizational components (see e.g. Dumond 1972; Jochim 1981).

Summary of Model and Hypothesis Formulation

The consequences of resource base characteristics, and thus resource use schedule, can be summarized as follows:

Foragers	Resource Base	Collectors
Little difference in potential proportional return from resources		Great difference in potential proportional return from resources
Little or no storage; relatively wide diet breadth (generalists)		Storage, relatively narrow diet breadth (specialists)
Group size/locality fluctuates with resource base: Diverse stable resources - small residential groups Mobile aggregate resources - large residential groups		Large residential groups near caching localities Smaller task groups at procurement locations

High residential mobility Low logistical mobility	Low residential mobility High logistical mobility
Relatively simple resource procurement organizational structure	More highly structured resource procurement organizational structure

Given the characteristics of the model as developed, the following hypothesis can be suggested:

> If the resource base is such that the potential yield of one or a few of the resources is disproportionately greater than other resources, hunter-gatherer subsistence-settlement systems will tend toward a collecting strategy characterized by storage, low residential mobility, high logistical mobility, and a relatively complex procurement organizational structure. On the other hand, if there is relatively little difference in potential yield of the resources, hunter-gatherer settlement systems will tend toward a foraging strategy characterized by little or no storage, high residential mobility, low logistical mobility, and a relatively simple procurement organizational structure.

There are a number of approaches to testing the hypothesis as formulated. One of the more obvious tests would be through a cross-cultural comparison of hunter-gatherers as described during the 'ethnographic present'. In this regard both Binford (1980) and Kelly (1983) have recently conducted useful comparisons, which are briefly reviewed below.

On the assumption that warmer, more thermally stable environments possess a greater number of 'critical' resources and thus a low frequency of spatial and temporal resource incongruency, Binford

(1980) suggested that hunter-gatherers inhabiting such environments would tend toward a foraging subsistence-settlement system with high residential mobility and low logistical mobility. In environments with greater thermal instability, and thus greater climatic variance, he suggested that hunter-gatherers would tend toward a collecting subsistence-settlement system with low residential mobility and high logistical mobility. The results of the comparison (Figure 9), suggested the hypothesized relationship is true, but with some notable exceptions, including the Slave, Micmac, Mistassini Cree, Copper Eskimo, Iglulik Eskimo, Polar Eskimo, and Netsilik Eskimo. According to Binford, these exceptions can be classified as 'cold-adapted' foragers who are 'serial specialists' in that they practise high residential mobility so as to position the group with particular food resources as they become available seasonally. While Binford did not pursue the study of the 'cold-adapted' foragers further, the model developed in this study would suggest that such practices are not due to any particular desire on the part of the groups to avoid putting up stores, but rather because there are no resources with disproportionately high yields to favour a storage strategy.

Kelly's (1983) study compared primary biomass and effective temperature of a number of regions with the number of residential moves per year. Increasing primary biomass was equated with generally decreasing fauna size and increasing dispersal, while decreasing effective temperature was equated with increasing fauna size and decreasing dispersal. The results suggest that the number of residential moves per year increases with increasing primary biomass and with increasing effective temperature. However, Kelly also found exceptions to the general pattern, including the Netsilik Eskimo (characterized by high residential mobility).

Both studies are promising in the examination of adaptation to varying environmental conditions on a world-wide basis, and are therefore useful in intiating development of a theory of hunter-gatherer mobility strategies. Nevertheless, these cross-cultural studies, as with most cross-cultural studies, suffer from a lack of time depth, and responses to changes in relevant independent variables cannot be examined. Furthermore, neither study addresses the issue of the effects of technology (and consequently, technological change). This is particularly important, since, on the one hand, while change in the resource base represents change external to the cultural system, change in technology (through invention or diffusion) represents internal system change.

Accordingly, a study which documents responses of mobility strategies to changes in the resource base, and in a technology that affects the potential return of critical resources, should provide a valuable insight into processes of change in hunter-gatherer subsistence-settlement systems, while at the same time serving as a useful complement to cross-cultural studies. The prehistoric Thule Eskimo-historic Netsilik Inuit transition in the central Canadian Arctic provides an ideal cultural sequence for such a study, since a) the cultural continuity has been established, b) the archaeological visibility of relevant settlement features is for the most part extremely high, c) a well documented sequence of climatic change affecting the abundance of critical resources has been established, and d) a major technological change relating to resource procurement, the rifle, was introduced into the area well before the major disruption of the society which accompanied the movement into permanent settlements.

CHAPTER TWO:

BACKGROUND TO THE STUDY

Study Area

The study area associated with the Thule-Netsilik transition sequence in the central Canadian Arctic is represented in Figure 9 and includes Somerset Island, Boothia Peninsula, King William Island, Adelaide Peninsula, and adjacent channels and inlets. Although the ethnographically-documented Netsilik Inuit territory was restricted primarily to the southern part of the study area (Rasmussen 1931), the ancestral Thule Eskimo culture has been well documented throughout the entire study area (see below). The west coast of Somerset Island and the central part of Boothia Peninsula are composed of relatively high (> 400 m), rugged plateaus of Precambrian granites and gneisses (Blackadar and Christie 1963), while King William Island, Adelaide Peninsula, the coastal areas of Boothia Peninsula and the east coast of Somerset Island comprise lowlands and/or plateaus of primarily Paleozoic clastic and carbonate sedimentary rock units (Blackadar and Christie 1963; Thorsteinsson and Tozer 1970). Surface materials are primarily rock and residium, with lesser amounts of glaciofluvial, glaciolacustrine, fluvial, marine, and colluvial sediments (Craig 1964; Dyke 1983, 1984).

The present climate is typically Arctic, with long, cold, dry winters and short, cool, damp summers (Canadian Hydrographic Service, 1982). Vegetation zones are primarily 'High Arctic' on Somerset

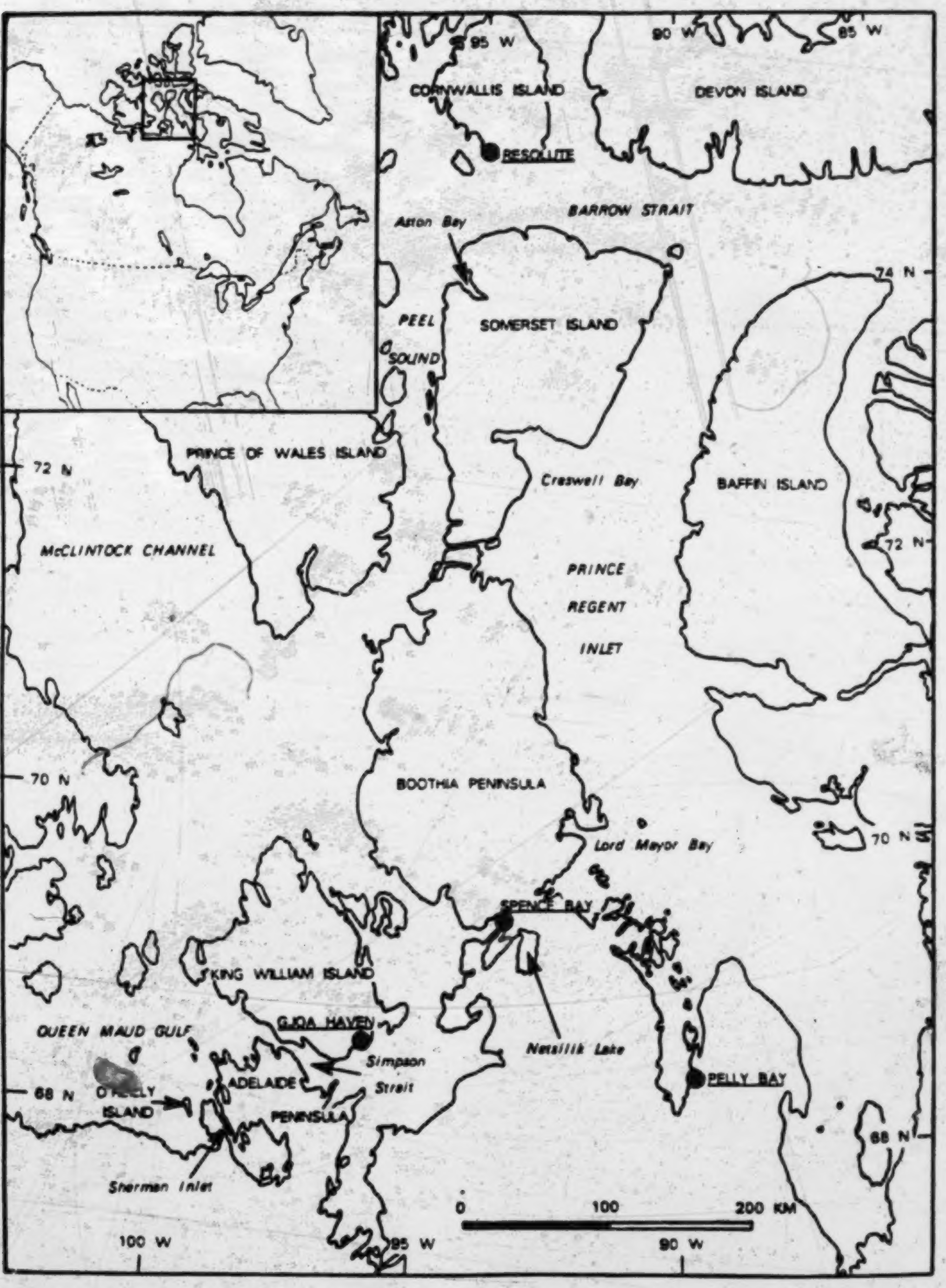

95 W
90 W
85 W
CORNWALLIS ISLAND
DEVON ISLAND
RESOLUTE
BARROW STRAIT
Aston Bay
74 N
PEEL SOUND
SOMERSET ISLAND
PRINCE OF WALES ISLAND
72 N
Creswell Bay
BAFFIN ISLAND
72 N
McCLINTOCK CHANNEL
PRINCE REGENT INLET
70 N
BOOTHIA PENINSULA
Lord Mayor Bay
70 N
SPENCE BAY
KING WILLIAM ISLAND
Netsilik Lake
QUEEN MAUD GULF
GJOA HAVEN
Simpson Strait
68 N
O'REILLY ISLAND
ADELAIDE PENINSULA
PELLY BAY
68 N
Sherman Inlet
0
100
200 KM
100 W
95 W
90 W

Figure 9. Location of the study area in the central Canadian Arctic.

Island and northern Boothia Peninsula, characterized by rock deserts with vegetation surviving only in the more favoured localities, while vegetation zones in the remainder (southern) part of the study area are primarily 'Middle Arctic' characterized by conspicuous vegetation but with frequent open desert areas (Bird 1964:54-55; see also Bliss 1977:3).

Resources

Resources in the study area occupy three major environmental subsystems; terrestrial, marine, and freshwater. Freeman (1984) presents a detailed treatment of each of the subsystems as they apply to the Arctic generally.

Terrestrial Subsystem. The terrestrial subsystem in the study region is typically 'tundra' in that primary productivity is low, there are relatively few animal species, and the trophic structure is simple. Major terrestrial resources are as follows:

a) Caribou. Caribou are by far the most economically important terrestrial species in the study area. Two subspecies, each with different behavioral characteristics, occur: Peary caribou and barren ground caribou.

Peary caribou are year-round inhabitants in the study area, are restricted to Somerset Island and northern Boothia Peninsula (Fischer and Duncan 1976; Thomas *et al.* 1977), and average 55-80 kg (Thomas and Broughton 1978). Both winter and summer group sizes tend to be very small, averaging four-five during both summer and winter, although group size varies from one to twenty (Fischer and Duncan 1976:91). The present Somerset Island population fluctuates considerably, due to local migration to and from Prince of Wales Island (Thomas and Broughton 1978), although it generally appears to remain less than 1000 animals. Population estimates for June 1974 and June 1975, for example, were 245 and 903 animals respectively (Fischer and Duncan 1976:89). Both summer and winter group concentrations tend to occur on the west coast south of Aston Bay to the west of Stanwell-Fletcher Lake and summer group concentrations only along Creswell Bay (op. cit. 90). Peary caribou on Boothia Peninsula presently number approximately 2300 animals (op. cit. 98), and apparently represent a cross between true Peary caribou and barren ground caribou (Thomas et al. 1978). Group size ranges from one to approximately 350, with an average of eleven (Fischer and Duncan 1976:175). Winter group concentrations tend to be restricted to the northeast part of the peninsula, while summer group concentrations are restricted primarily to the northwest part of the peninsula (op. cit. 98).

True barren ground caribou, (averaging 80-110 kg - Kelsall 1968), rarely occur in the study area, having been reduced considerably in number since the 1930's (Kelsall 1968; Miller et al. 1978). During the early contact period, however, and by extrapolation the prehistoric period, they migrated on a seasonal basis to Boothia Peninsula and onto King William Island (see for example Amundsen 1908; Stackpole 1965). According to Kelsall (1968:65), these caribou would have wintered on the tundra. Migration routes appear to have been traditional, with major crossings at the narrows of Simpson Strait, near Crescent Harbour on Sherman Inlet, and at several locations in the Netsilik River-Netsilik Lake region, including the west side of Pangnikto Lake (Amundsen 1908; Rasmussen 1931; Balikci 1964). Although prehistoric and early historic populations are difficult to estimate, herds of 10,000 to 100,000 have been recorded wintering on the northern barrens (Kelsall 1968:64-66).

b) Musk-oxen. Musk-oxen, (averaging 340 kg - Tener 1965), are extremely rare in the study area. The most recent population estimates are 25 on Somerset Island, none on Boothia Peninsula, and none on King William Island (Urquhart 1982). They are extremely rare on Adelaide Peninsula (Gunn et al. 1984), although a herd of seventeen was observed at Sherman Inlet during the course of field work associated with the present study. Historically, musk-oxen appear to have been at least present on Boothia Peninsula (Ross 1835; Hone 1934; Balikci 1964), but apparently never in significant numbers.

c) Other terrestrial resources. Arctic foxes, Arctic wolves, Arctic hares, wolverines, and ptarmigan occur year round but in relatively small numbers, and, until the recent emphasis on trapping, had historically been of secondary importance (Brice-Bennett 1976).

Marine Subsystem. As for the terrestrial subsystem, the marine subsystem primary productivity is generally very low, with a resulting low secondary productivity and a relatively simple food chain. One of the most important considerations in the examination of this subsystem is the distribution, type and thickness of sea ice cover. In the study area, sea ice covers all main water bodies eight-ten months per year, and as a result, much of the secondary productivity is unavailable. In the study area, sea ice begins to break up northeast of Somerset Island in July, and by late August northern Prince Regent Inlet, Barrow Strait, and northern Peel Sound are all open (with the ice clearing from south to north and then west to east - Canadian Hydrographic Service 1982:165). Melting in Prince Regent Inlet south of Bellot Strait is balanced by an influx of ice from further south, such that the region rarely experiences total open water conditions. Southern Peel Sound, Franklin Strait, and the water bodies bordering King William Island, Adelaide Peninsula, and Boothia Peninsula break up in July, but because of local shoal areas and islands and the southward drift of ice from McClintock Channel, ice usually melts _in situ_, rarely being cleared. Melting is normally completed by the middle of August (_op. cit._:170). Freeze-up throughout the area begins approximately mid-September and is completed by early-late October (_op. cit._:162, 170).

Major marine faunal resources are as follows:

a) Bowhead Whales. Bowhead whales (averaging 35,000-45,000 kg - Banfield 1974) are extremely rare at present, with the entire eastern Arctic population estimated at 'a few hundred' (Reeves _et al._ 1983). Prior to the extensive harvest by European and Euroamerican whalers beginning in the 18th century, however, bowhead whale stocks were much higher. Mitchell and Reeves (1981) estimate that as of A.D. 1825 bowhead whale stocks in the eastern Arctic were approximately 11,000, while Mowat (1984) estimates that prior to all non-native whaling in North America stocks were approximately 150,000. Assuming that prehistoric distribution (but not necessarily abundance) was similar to that recorded during the historic period in the study area, Creswell Bay and northern Peel Sound constituted the western-most part of the principal summer feeding grounds (see Figure 10 and Reeves *et al.* 1983:30-31). Penetration into middle and southern Prince Regent Inlet and Peel Sound was apparently restricted by late clearing and/or *in situ* melting of the ice.

b) Walrus. Walrus (averaging 570-760 kg - Banfield 1974) are rare in the study area, with small numbers occurring following break-up in the summer to the north and east of Somerset Island (Canadian Wildlife Service 1972; Finley 1976). These animals apparently migrate to the area from the Baffin Bay-Davis Strait region (Davis *et al.* 1980:43). Walrus numbers, as those of bowhead whales, were severely depleted during the era of European and Euroamerican whaling. However, from the historic catch records compiled by Ross and MacIver (1980), they appear to have always occurred in relatively small numbers in the study area.

c) Beluga Whales. Beluga whales (averaging 1360 kg - Banfield 1974) occur in large numbers in the study area, primarily in northern Prince Regent Inlet, Creswell Bay, and northern Peel Sound, these areas serving as major summer feeding grounds. Finley (1976) estimates a summering population of approximately 5500 whales in the area.

d) Narwhal. Narwhals (averaging 600-800 kg - Banfield 1974) are apparently at least as abundant as belugas in the northern study area during the summer (Davis *et al.* 1980) and apparently congregate at major feeding grounds in Creswell Bay and middle and northern Peel Sound.

e) Ringed Seal. The ringed seal (averaging 90 kg - Banfield 1974) is the most widespread of marine mammals in the Arctic, and is usually a permanent resident throughout most of its range, maintaining breathing

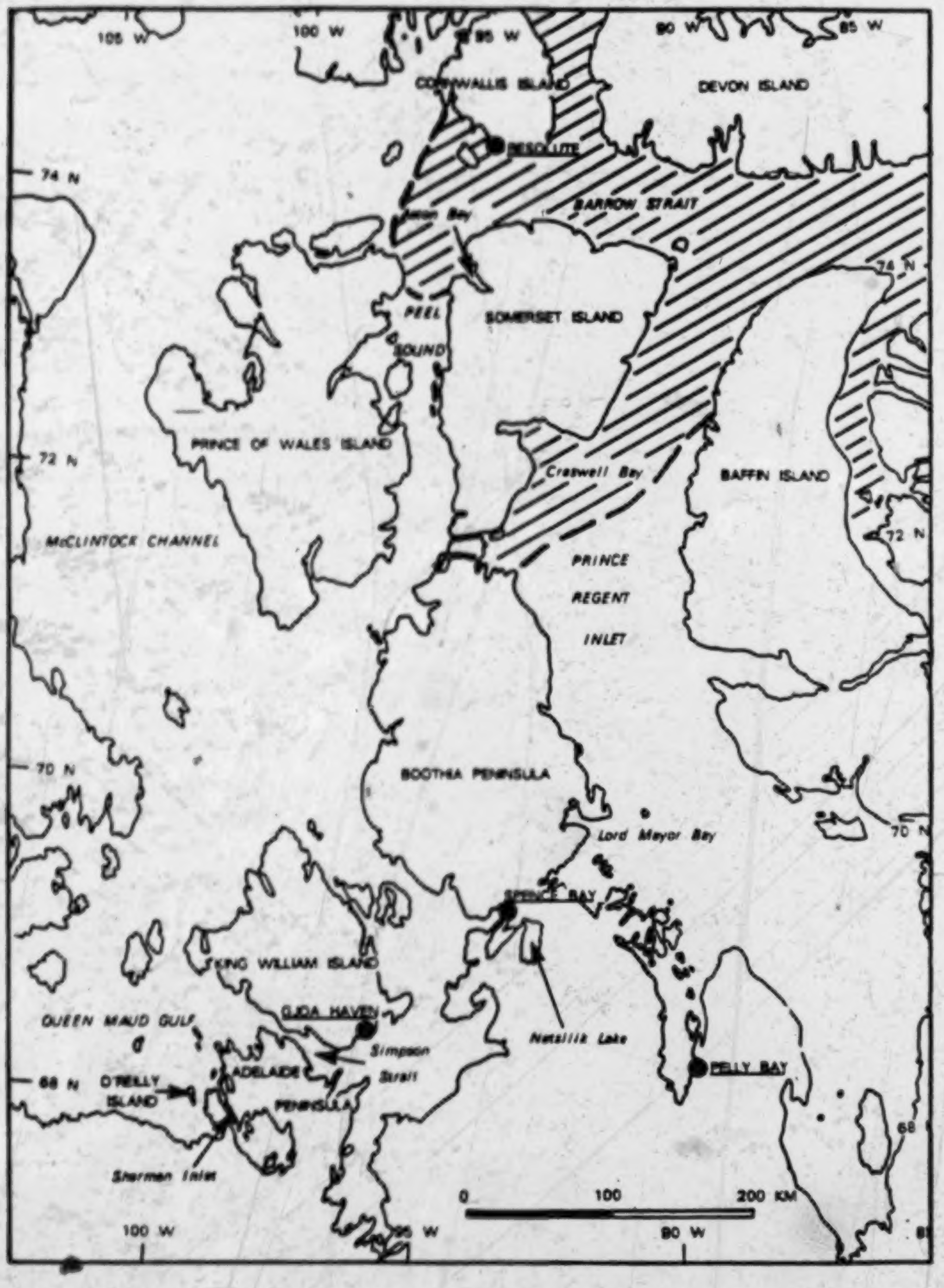

105 W
100 W
95 W
90 W
85 W
CORNWALLIS ISLAND
DEVON ISLAND
RESOLUTE
74 N
BARROW STRAIT
Aston Bay
PEEL
SOUND
SOMERSET ISLAND
PRINCE OF WALES ISLAND
72 N
Creswell Bay
BAFFIN ISLAND
McCLINTOCK CHANNEL
PRINCE
REGENT
INLET
BOOTHIA PENINSULA
70 N
Lord Mayor Bay
SPENCE BAY
KING WILLIAM ISLAND
Netsilik Lake
GJOA HAVEN
QUEEN MAUD GULF
Simpson
Strait
PELLY BAY
68 N
O'REILLY
ISLAND
ADELAIDE
PENINSULA
Sherman Inlet
0
100
200 KM
100 W
95 W
90 W

Figure 10. Areas of major bowhead whale concentrations in the study area. After Reeves *et al.* 1983.

holes in the sea ice during the winter. It is believed to be sedentary, undergoing local migrations only, and those generally only in response to changing ice conditions (Davis et al. 1980). The amount and stability of fast ice appears to determine the upper size limit of ringed seal populations (Smith 1981). In the study area, ringed seals appear to show the highest population densities in Aston Bay on the northwest corner of Somerset Island (greater than 19.5/1,000 hectares), in Bellot Strait (11.7-19.5/1,000 hectares), along the east coast of Boothia Peninsula in and north of Lord Mayor Bay (greater than 19.5/1,000 hectares), on the west coast of Boothia Peninsula north of Spence Bay (greater than 19.5/1,000 hectares) (all estimates from Finley 1976), and apparently in the Queen Maud Gulf, Rasmussen Basin, and Simpson Strait regions (Brice-Bennett 1976). Smith et al. (1978) and Kingsley and Lunn (1982) also indicate high ringed seal populations in the Aston Bay area.

f) Bearded Seal. Bearded seals (averaging 400 kg - Banfield 1974) are found throughout the Canadian Arctic, tending to be solitary. They are strongly associated with moving pack ice, rarely maintain breathing holes in fast ice, and tend to migrate into the area following the initiation of break-up (Finley 1976). They are never very abundant, although local concentrations apparently occur in eastern Queen Maud Gulf (Rasmussen 1931; Brice-Bennett 1976).

g) Harp Seal. Harp seals (averaging 160-180 kg - Banfield 1974) occur in the north part of the study area, but are not numerous, and apparently migrate into the area in summer following break-up (Finley 1976).

i) Polar Bears. Polar bears (averaging 420-500 kg - Banfield 1974) occur throughout the study area, but are most abundant in Lord Mayor Bay, north of Cape Felix (northern tip of King William Island), and near Creswell Bay and Aston Bay (Brice-Bennett 1976; Finley 1976). Historically, they were rarely hunted primarily for food, but instead for the pelt (e.g. Rasmussen 1931; Balikci 1964).

Freshwater Subsystem. As noted by Freeman (1984), the freshwater subsystem is of least (although not insignificant) potential importance to Arctic inhabitants. Arctic freshwater productivity is low, with lakes, for example, averaging approximately 1.25 kg of fish per hectare (_op. cit._ 40). However, at least for the Netsilik Inuit, the system is of considerable importance due to the fact that it seasonally supports large populations of anadromous fish (arctic char) and nesting and migrating waterfowl.

Anadromous arctic char leave freshwater lake systems immediately following ice break-up, and return to spawn and/or overwinter in late summer and early fall. They are most abundant and accessable during the late summer/fall return migration, especially along shallow connecting rivers. Although most river/lake systems in the southern study area feature char migrations, in the northern area only the Union River and Stanwell Fletcher Lake system on Somerset Island, and the Nudlukta Inlet and Nudlukta Lake system on Boothia Peninsula support appreciable migrations (Brice-Bennett 1976; Riewe 1976; McCart and Beste 1979).

The most important summer migratory waterfowl concentration localities in the study region are the Rasmussen Lowlands southwest of Spence Bay (McClaren _et al._ 1976), Middle Lake north of Spence Bay, Wrottesley Inlet on northwest Boothia Peninsula, and the Bellot Strait and Creswell Bay areas of Somerset Island (Davis et al. 1977). Over fifty species of migratory birds have been reported in these areas, the most important of which include snow geese, brant geese, Canada geese, whistling swans, common and king eiders, and various gulls (McClaren et al. 1976).

History of Climatic Change

Evidence for climatic change since the end of the last major glaciation in the Canadian Arctic and Greenland has been well documented by Bryson and Wendland (1967), Dansgaard et al. (1971), Fredskild (1972), Miller (1973), Nichols (1972, 1975) and Barry et al. (1977), among others. Of particular concern for the present study is the nature of climatic change during the last approximately 1000 years (see Figure 11). The period from approximately 1100-800 B.P. witnessed a warming trend such that mean summer temperatures were approximately 1° C warmer than present summer temperatures (Nichols 1975). From approximately 800-400 B.P., an apparent cooling trend developed, and culminated in what is termed the 'little ice age' from approximately 400-100 B.P., during which time local glaciers advanced, summers became considerably cooler and winters colder and drier (Barry et al. 1977).

Effects of Climatic Change on the Resource Base

Terrestrial Subsystem. The two major terrestrial mammals in the study

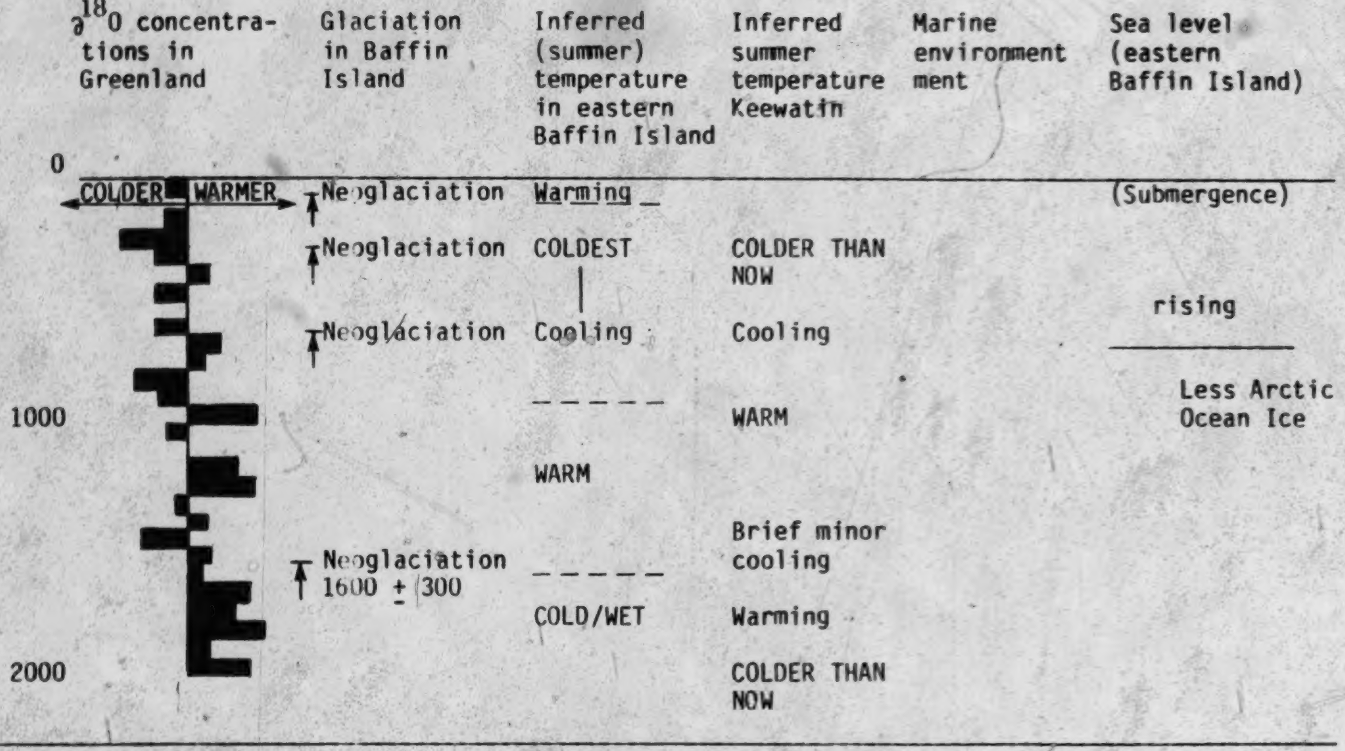


Figure 11. Summary of major episodes of environmental change in the eastern Canadian Arctic and Greenland during the last 2000 years. After Barry et al. 1977.

region, caribou and musk-oxen, are apparently very sensitive to short-term, local climatic change (see e.g. Miller et al. 1981). Warm, wet winter conditions tend to create hard ice and/or snow crusts, as well as heavy snow accumulations, which are detrimental to at least Peary caribou and musk-oxen on restricted ranges in the Arctic Islands (Miller et al. 1977). Barren ground caribou population densities, on the other hand, appear to be more closely related to conditions on summer calving grounds and to population densities of the mainland herds generally. Cold weather, especially seasonally late blizzards on summer calving grounds, can substantially reduce caribou populations through high mortality rates among new-born calves (Kelsall 1968; Parker 1972). Furthermore, the barren ground caribou that previously summered in the study area can be considered a marginal population. Since marginal populations tend to be maintained only during times of population increase in the 'core' areas, and since colder conditions will apparently also affect populations in 'core' areas, the pressure to maintain large marginal groups is lessened (Kelsall 1968:108). Therefore, while numbers of Peary caribou will tend perhaps to increase during cooling climatic periods, the opposite would appear to be true for barren ground caribou. McGhee (1972) and Gordon (1975) suggest somewhat similar barren ground caribou responses in the Amundsen Gulf area and the barren grounds, respectively.

Marine Subsystem. The most important direct effect of climatic change in the marine ecological subsystem relates to the distribution, duration and thickness of sea ice. Bryson and Wendland (1967) and

Nichols (1975) suggest fast ice formation increased during the cooling period of 800-400 B.P., reaching a peak extent during the period 400-100 B.P. In most areas this would have resulted in increased ringed seal habitat and corresponding larger populations (c.f. Smith and Hammil 1981). In addition to increasing the extent of fast ice, the cooling trend also would have resulted in later break-up dates and earlier freeze-up dates (i.e. greater duration), allowing access to seals for longer periods. However, there is a maximum thickness of ice beyond which ringed seals do not maintain breathing holes, and instead move to the fast ice edge and/or leads (McClaren 1958). Schledermann (1976a) suggests that greater than maximum permissible thicknesses (for breathing hole maintenance) may have been attained during the cold period of 400-100 B.P.

Migratory marine species such as bowhead whales, beluga whales, narwhals, bearded seals, harp seals, and walrus would probably have been reduced in distribution and abundance in the study area as extensive fast ice and closing leads are detrimental to such species. Bowhead whales would have been particularly affected by the increased ice distribution during the cooler periods, as, at least in the eastern Arctic, they tend to follow the retreating ice margin and enter the High Arctic channels only when a maximum of open water is available (Reeves *et al.* 1983:60). Schledermann has suggested that bowhead whale distribution during the coldest period (400-100 B.P.) was characterized by "scarce availability...and poor predictability" (1976a:41).

Freshwater Subsystem. Climatic change would probably have the least effect on animal populations utilizing the freshwater subsystem, since only relatively slight changes in freeze/melt cycles, runoff characteristics, and perhaps primary productivity, would be expected. Accordingly, the primary changes would perhaps be in adjustments in the timing of waterfowl migrations and, perhaps, anadromous char migrations.

Summary: The major effects of climatic change on resources in the study area over the past approximately 1000 years are summarized in Table 1.

Within the study area, by far the two most abundant resources in terms of potential yield during the warm period of 1000-800 B.P. would have been bowhead whales in the northern part of the study area, and barren ground caribou in the southern part of the study area. In the northern part of the study area, for example, the yield from a single bowhead whale would have approximated the yield from the entire present caribou and musk-oxen populations. To the south, large concentrations of migratory barren ground caribou (probably 10,000 or more) at primary crossing localities would have been equally important in terms of potential yield. Thus, assuming requisite technology, the potential available yields in these areas are disproportionately centered on one species in the north and one in the south (it should be noted that there appears to have been little if any overlap in areas of the respective species).

With deteriorating climatic conditions, the two species would have been dramatically reduced in numbers, and probably altered in distribution, while several other critical species (ringed seal, Peary

Table 1. Summary of the effects of climatic change on habitat and resources in the study area.

Dates	Climate	Effects	Resource Status
1000-800 B.P.	Warming trend	Relatively little sea ice cover, less fast ice	Abundance of all marine mammals except ringed seals
		Less winter forage in restricted areas	Possibly fewer Peary caribou, musk-oxen
		Large barren ground populations south of study area, favourable calving conditions	Abundant barren ground caribou
800-400 B.P.	Cooling trend	Increasing sea ice cover during major migration periods, increasing fast ice	Decreasing abundance of all marine mammals except ringed seals. Increasing ringed seal abundance
		Probable decrease in major barren ground caribou herds, less favourable conditions on calving grounds	Increasing abundance of Peary caribou and musk-oxen Decreasing abundance of barren ground caribou
400-100 B.P.	Coldest	Greatest extent of sea ice cover and fast ice. Possible ice thicknesses greater than maximum for breathing hole maintenance	Continued decrease in all marine mammals. Ringed seal population may have started to decline at this time, and/or their distributions were altered.
		Least favourable calving ground conditions, and probably least abundance of barren ground caribou 'core' herds	Continued decrease in barren ground caribou; Peary caribou and musk-oxen at population maximums(?)

caribou, musk-oxen) would have increased in abundance and probably expanded in distribution. Finally, with extreme climatic deterioration, probably all marine mammals, and at least some terrestrial mammals, primarily barren ground caribou, would have been adversely affected.

Sociocultural Background

I. Prehistory

Archaeological investigations in the study area were initiated by Knud Rasmussen in 1923 (Mathiassen 1927; Rasmussen 1931), who excavated the site of Malerualik (site 81-61 in this study) on King William Island. Several collections obtained in the 1930's from the Somerset Island and Boothia Peninsula regions were described by Vanstone (1962), and in 1961 W.E. Taylor (Taylor and McGhee 1979) excavated two sites on the north coast of Creswell Bay on Somerset Island. During the past fifteen years a large number of archaeological investigations have been conducted in the study area and are summarized in Table 2. While several of these investigations yielded evidence of substantial Paleoeskimo (approximately 3500-1000 B.P.) occupations (e.g. Bielawski, 1980, 1982; Ramsden 1981, 1982; Damkjar 1983, 1984), later Neoeskimo occupations (approximately 1000 B.P.-present) are of particular importance to the present study.

The Netsilik Inuit who historically inhabited the study region are the cultural and biological descendants of Thule Eskimos who initially migrated across the Canadian Arctic and into Greenland approximately 1000 A.D. (Vanstone 1962; McGhee 1975, 1983). Two migration routes

Table 2. Previous archaeological investigations in the study regions.

Year	Area	Type of Investigation	References
1923	King William Island (Malerualik)	Site excavation	Rasmussen 1931 Mathiassen 1927a,b
1930's	Creswell Bay Boothia Peninsula	Surface collections(?)	Vanstone 1962
1961	Creswell Bay PeJr-1, Pejq-1	Site excavations	Taylor & McGhee 1979
1973	Creswell Bay PcJq-5	Site excavation Site survey	Yorga 1979a
1975	Creswell Bay	Site survey	Clarke 1979
1976	Creswell Bay PeJr-1, PcJq-5	Site excavations	McCartney 1979a
1977	Aston Bay, Creswell Bay, Lord Mayor Bay, Netsilik River	Site surveys	Schledermann 1978
1978	Aston Bay	Site survey	Bielawski 1980, 1982
1978	Creswell Bay	Bowhead whale bone inventory	McCartney 1978
1979-82	Stanwell-Fletcher Lake	Excavation	Bielawski and Cole 1980
1980	Russell Island	Site excavations	Ramsden 1981
1980	Back Bay	Site excavations	Ramsden 1981
1982	Back Bay	Site excavations	Ramsden 1982
1983-85	Creswell Bay	Site surveys Site excavations	Damkjar 1983, 1984

have been suggested. A northern route along Parry Channel which essentially bypassed most of the Netsilik area initially, and which later led to a colonization of the area from the north, has been suggested by McGhee (e.g. 1975, 1983), McCartney (1977), (Figure 12a). Morrison (1983a), and Arnold and Stemmle (1984), on the other hand, suggested that a contemporaneous or slightly later migration along the southern Arctic coastal mainland led to the colonization of much of the Netsilik area (Figure 12b). In view of the generally early Thule artifacts excavated by Rasmussen at Malerualik (Mathiassen 1927a), and the early dates and artifact and dwelling styles associated with other Thule sites in the southern part of the study area (see below), Morrison's scheme would appear to have the most support. Following the establishment of Thule culture throughout the study area approximately 800-900 B.P., cultural development continued to historic times in the southern part, but apparently by approximately 300-400 B.P. the northern part had been abandoned. This abandonment of the northern region was suggested by McGhee (1969/70, 1975) and McCartney (1977) to have been the result of the decline of the abundance of summering bowhead whales in the regions, which in turn was related to cooling climatic conditions. It should be noted that although both McGhee and McCartney (see especially McCartney 1980) stress the centrality of bowhead whales in the Thule subsistence economy, Freeman (1979) and Yorga (1979b) have suggested they were relatively minor components.

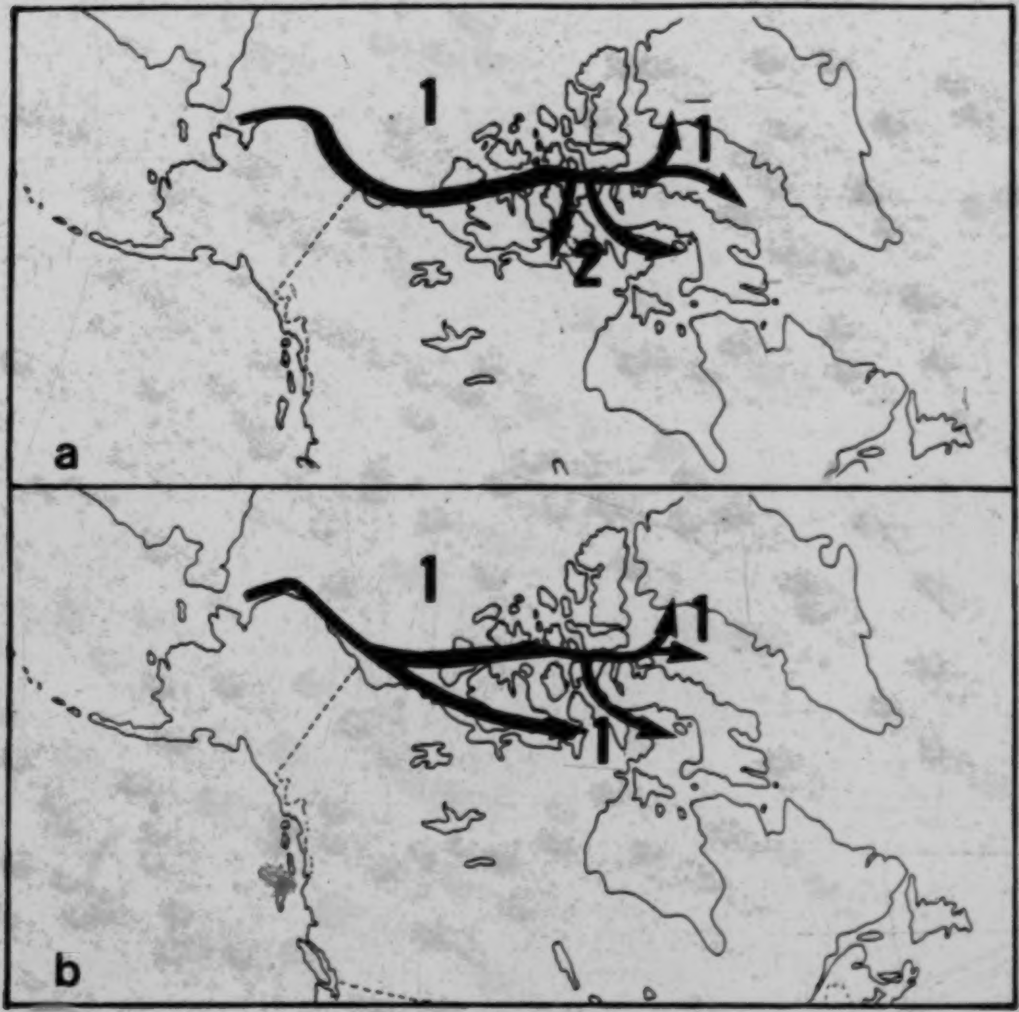


Figure 12. a) Colonization of the Netsilik area as suggested by proponents of the Parry Channel route, with initial colonization (1) and subsequent expansion (2). b) Colonization of the Netsilik area as suggested by proponents of the Arctic mainland coast route, with approximately contemporaneous colonization with more northern areas.

II. History Since Contact

The first contact with the Netsilik Inuit was in 1830 during John Ross' voyage of 1829-33 in search of a northwest passage. Eleven more expeditions visited the area between Ross' expedition and the time they were first studied by an ethnographer in 1923 (Table 3). In that year Rasmussen spent seven months in the area, publishing the results of his field work 'The Netsilik Eskimo' in 1931. They were later studied by Balikci (1964, 1968, 1970, 1984) and Damas (1968, 1969a, 1969b), and descriptions of traditional Netsilik society have since served as examples of 'pristine' Inuit society (see for example Keene 1979; Binford 1980; Kelly 1983).

At the time they were first visited by Rasmussen, the Netsilik numbered 259 individuals divided into six local bands (Figure 13), which were "bilateral with prominence of male relevant ties" in composition and characterized by 'elastic' social boundaries (Damas 1968:113). The nuclear family was the smallest collaborative social unit, but very rarely constituted an autonomous economic unit. Instead, extended families, averaging 15-20 persons (Damas 1968:115) constituted the primary economic unit during the spring and summer when seals (spring) and fish (summer) were obtained. During the fall, two or three extended families often combined at fish weirs for anadromous arctic char as they returned to freshwater lakes, and at rivers and lake crossings for the interception of migrating caribou. Winters were spent primarily on the sea ice hunting seals at breathing holes, with maximum population aggregates of up to 100 at this time. Additional faunal resources procured, but of apparently secondary

Table 3. Expeditions to the Netsilik area prior to 1923.

Year(s)	Expedition Leader	Time Spent in Area	Reference
1829-32	John Ross	3 years	Ross 1835
1834	Back	2 weeks	Back 1836
1839	Simpson	2 weeks	Simpson 1843
1846(7?)-48	Franklin	2(1?) years	Cyriax 1939
1847	Rae	2 weeks	Rae 1850
1852*	Kennedy	1 week	Kennedy 1853
1854	Rae	6 weeks	Rae 1855
1855	Anderson	1 week	Anderson 1940-41
1858-59	M'Clintock	1 year	M'Clintock 1859
1869	Hall	4 weeks	Nourse 1879
1879	Schwatka	8 months	Stackpole 1965
1903-05	Amundsen	2 years	Amundsen 1908

*Includes Bellot Strait

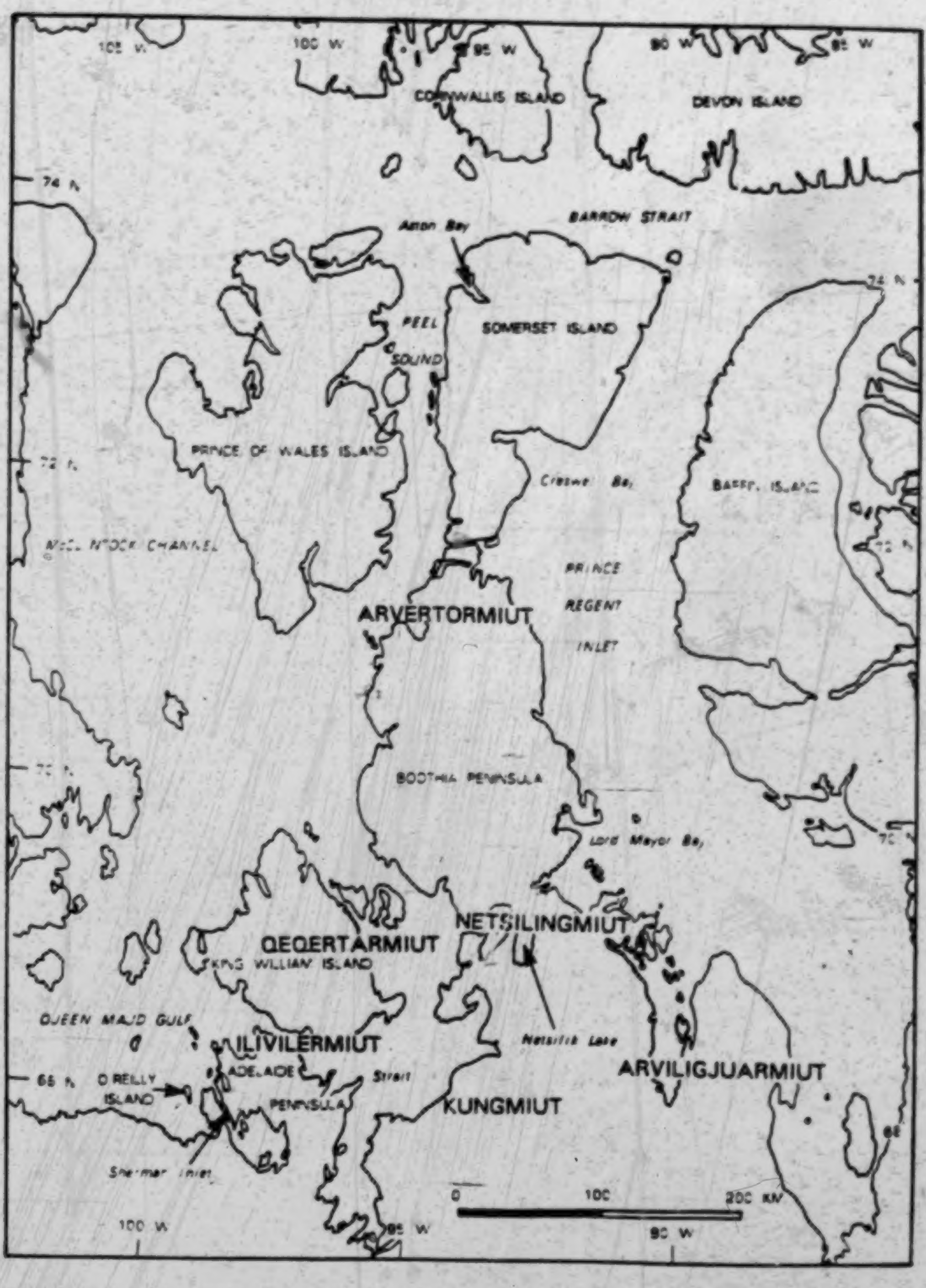

105 W
100 W
95 W
90 W
85 W
CORNWALLIS ISLAND
DEVON ISLAND
74 N
Aston Bay
BARROW STRAIT
74 N
PEEL
SOUND
SOMERSET ISLAND
PRINCE OF WALES ISLAND
72 N
Creswell Bay
BAFFIN ISLAND
72 N
McCLINTOCK CHANNEL
PRINCE
REGENT
INLET
ARVERTORMIUT
70 N
BOOTHIA PENINSULA
Lord Mayor Bay
70 N
NETSILINGMIUT
QEQERTARMIUT
KING WILLIAM ISLAND
QUEEN MAUD GULF
ILIVILERMIUT
68 N
O'REILLY ISLAND
ADELAIDE
PENINSULA
Strait
Netsilik Lake
ARVILIGJUARMIUT
KUNGMIUT
Sherman Inlet
0
100
200 KM
100 W
95 W
90 W
68

Figure 13. Distribution of local bands in the study area at the time of Rasmussen's ethnographic field studies in 1923. After Rasmussen 1931.

importance, were polar bears, foxes, wolves, hares, marmots, ptarmigan, and migratory waterfowl (see e.g. Balikci 1964, 1970, 1984; Brice-Bennett 1976).

Traditional material culture was typically 'Eskimo' in the use of harpoons for sealing, lances, bows and arrows, kayaks for caribou hunting, fish spears for fishing, and skin tents (summer and fall), and snow houses (winter) for residential dwellings. Dogs were generally rare, and sleds were typically constructed from frozen fish wrapped in seal skin, from wood, or occasionally entirely of ice.

Early in the 20th century rifles were obtained in small quantities through trade with whalers at Repulse Bay, or through trade with Inuit groups from Chantrey Inlet to the south, who in turn obtained them from the Baker Lake Hudson's Bay post. In 1923 a trading post was established on King William Island at Malerualik (for the first time ensuring constant supplies of rifles and ammunition), and was subsequently moved to Gjoa Haven in 1926. Additional trading posts were established at Port Leopold on Somerset Island in 1926 (closed in 1927), at Bellot Strait in 1937, and at Spence Bay in 1949. The widespread use of the rifle was accompanied by the addition of fox trapping, which gradually developed as an important secondary activity (Brice-Bennett 1976).

The transition from a hunting-and-trapping economy to one of wage labour-hunting-and-trapping took place in the 1960's with the movement of almost all families to the settlements of Gjoa Haven, Spence Bay, Pelly Bay (immediately east of the study region) and Resolute (immediately north of the study region). Two families, however, remained at Creswell Bay and continue to live there on a permanent basis (Kemp *et al.* 1977).

Problems and Hypotheses

The climatic and cultural changes in the study area present two problems that can be addressed in the context of the mobility strategy model developed in Chapter 1.

1. How did the change in the abundance of the two primary resources (bowhead whales and barren ground caribou) in the study area during the prehistoric Thule occupation of the area affect mobility strategies, and thus settlement systems?
2. What effect did the introduction of the rifle, through the decrease in pursuit time of selected resources, have on mobility strategies, and thus settlement systems?

Problem 1. The background to the first problem has been developed in the discussion on the resource base and climatic change. From the original hypothesis presented in Chapter 1, the first study hypothesis can be stated as follows;

> A decrease in the distribution and abundance of bowhead whales in the northern part of the study area, and in barren ground caribou in the southern part of the study area, will be accompanied by a transformation of subsistence-settlement systems based on collecting strategies to subsistence-settlement strategies based on foraging strategies. This will include an increase in residential mobility, a decrease in logistical mobility, an increase in diet breadth, and a

decrease in logistically-oriented social differentiation.

Problem 2. Since the use of the rifle decreases pursuit time, the principal effect of the introduction of the rifle according to the mobility model would be an increase in diet breadth and a tendency to maintain a foraging strategy. This is apparently precisely the effect the introduction of the rifle had on the Muskrat Dam Lake Cree of northern Ontario (Winterhalder 1981b). However, the problem is considerably more complex for two reasons. First, the introduction of the rifle, while allowing greater pursuit efficiency for certain resources, was accompanied by a shift to a trapping economy. The rating of fox as one of the critical resources is therefore artificial, but the resource nevertheless required extensive logistical mobility due to the maintenance of trap lines (see e.g. Brice-Bennett 1976).

Second, the use of the rifle allowed greater food yields, and therefore larger dog teams, which were in turn required for maintaining trap lines. The use of larger dog teams, however, in turn decreased search time. This, together with the decrease in pursuit time, would have resulted in an intensification of the harvest of critical resources (primarily caribou and ringed seals, secondarily musk-oxen). However, this intensification would not be accompanied by increased specialization of procurement strategies or the development of specialized procurement groups. Such strategies are themselves designed to decrease search and pursuit costs, but the rifle in effect accomplished this.

Thus, the overall effect of the introduction of the rifle would have been the intensification of the exploitation of highly rated resources, a probable decrease in diet breadth, increased logistical mobility and storage, and a decrease in co-operative procurement techniques.

The second study hypothesis can be stated as follows;

> The introduction of the rifle will be accompanied by a transformation of a subsistence-settlement system based on a foraging strategy to a subsistence-settlement system based on a collecting strategy, but one which lacks specialized procurement techniques. This will include an increase in logistical mobility, a decrease in residential mobility, a decrease in diet breadth, and no change or a decrease in logistically-oriented social differentiation.

CHAPTER THREE:

ARCHAEOLOGICAL CONSIDERATIONS

Any attempt to interpret cultural systems and processes through their associated archaeological remains must address the nature and consequences of formation processes responsible for the spatial, quantitative, formal, and relational properties of those remains; that is, archaeological observations (data) do not 'speak for themselves', and as such cannot be automatically translated into past human behavior or past 'lifeways' (see for example Binford 1968 and Hill 1972 for detailed discussions). The recognition of the importance of the understanding of formation processes can be traced to the pioneering ethnoarchaeological studies of Ascher (1961, 1962, 1968), who considered the archaeological record as a disorganized arrangement of material produced after the event(s) which archaeologists attempt to reconstruct from that material. In effect, "time's arrow" was considered to reduce progressively the quantity, quality, and patterning of data such that an understanding (knowledge) of the past is directly related to the preservational state, which in turn is related to the time elapsed since cultural deposition. On the basis of this "entropy" view of formation processes, Ascher admonished archaeologists against interpreting the archaeological record on what he termed the erroneous notion of the "Pompeii premise" (Ascher 1961:324), suggesting that the determination of many, if not most, cultural processes and organizational "realities" were simply beyond the limits of archaeological cognizance (1962:362). Current approaches to the study of formation processes center on Schiffer's "behavioral archaeology" (Schiffer 1972, 1976, 1977, 1983) and Binford's "organizational dynamics" (for want of a better term - see for example Binford 1981b, Binford and Sabloff 1982).

According to Schiffer,

> "...archaeological remains are not in any sense a fossilized cultural system. Between the time artifacts were manufactured and used in the past and the time these same objects are unearthed by the archaeologist, they have been subjected to a series of cultural and noncultural processes [and thus] archaeological remains are a distorted reflection of a past behavioral system" (1976:11-12).

Accordingly, Schiffer developed a method of analysis whereby the context of cultural remains is first considered, and subsequently the various formation processes which affected the cultural remains in the various contexts. Context can be either systemic, in which material is "...within an ongoing behavioral system - [it is] handled or observed..." (1976:28), or archaeological, in which material is in a "nonbehavioral state" (op. cit.). Schiffer classified formation processes as either cultural or noncultural, with cultural formation processes being defined as those that govern the movement of material between systemic and archaeological context, and noncultural formation processes being defined as environmental processes that affect artifacts primarily in an archaeological context (1976:14-15). According to Schiffer's "behavioral archaeology" methods, the identification of post-depositional noncultural formation processes, followed by the identification of transformation processes responsible for the movement of material from systemic into archaeological context, enables a "reconstruction" of cultural systems "distorted" in the archaeological record:

> The basic practical implication of the transformation view is quite simple: regardless of how much evidence is present, the archaeologist cannot read behavior and organization directly from patterns discovered in the archaeological record. However, because formation processes themselves exhibit patterning...the distortions can be rectified by using appropriate analytical techniques and inferential tools built upon our knowledge of laws governing these processes (1983:677).

A different approach to the "reconstructionist" view, with its explicit inductive methodology, has been advanced by Binford and is here referred to as the "organizational dynamics" approach. The "organizational dynamics" approach began with his classic Archaeology as Anthropology (1962), and is most recently articulated through his various ethnoarchaeological and related studies (see for example Binford 1976, 1977, 1978a, 1978b, 1979, 1980, 1981a, 1981b, 1982, 1983; Binford and Sabloff 1982). Binford's concern is primarily with the determination of how organizational properties of a cultural system condition forms of static patterning in the archaeological record, and in turn, with the explanation of differences and similarities among organizational properties of cultural systems. According to Binford, behavioral reconstruction as envisaged by Schiffer is impossible, since the characteristics of the archaeological record, even under the best of conditions, represent a "...massive palimpsest of derivatives from many separate episodes" (1981a:197). In Binford's view, this does not reflect limitations of the archaeological record, but instead calls for a different view of culture:

> If we look at culture more as the archaeologist might see it, we see nothing of the individual's motives or of the ideas and values that rendered a participant's life meaningful and valued by others. Instead, what we see are places used over and over in the same way and continuities in the way things were done at these places. We see repetitive patterns in the

> forms and kinds of material items as well as modified places used by different groups. These are the cultural contexts in terms of which peoples of the past must have both learned and carried out their culturally distinctive forms of behavior (regardless of the justification for them). We see duration of form and continuity in design and placement, as well as associations between things that betray durations of organized ways of doing things that greatly exceed the life spans of human participants (1981a:197).

Thus, it is the patterning produced by cultural systems over time as a consequence of various levels of organization that is represented by the archaeological record. This organization, and consequent archaeological patterning, is difficult to determine through the observation of events and episodes in what Binford refers to as the "quick time" perspective of the ethnographer or the participant in a cultural system (1981a:197). Furthermore, it is

> "...necessary for archaeologists to investigate the archaeological record as a different order of reality, the patterned structure of which represents not a single accumulation of little events, but rather some of the basic organizational constraints and determinants operating on the events or episodes of daily living" (op. cit.:197)

From Binford's perspective, then, the archaeological record is not a distorted ethnographic 'reality' but instead a structured consequence of organizational levels not directly observable by an ethnographer. Furthermore, it is apparently on these levels of organization that "ecological-evolutionary selection operates, rather than the level of the specific event" (op. cit.).

In discussing the approaches of Schiffer and Binford, Willey and Sabloff (1980:249-254) consider Schiffer's "behavioral archaeology", based on the concepts of formation processes, to be "low-level" theory, which although seen as an essential foundation for the study of culture process and culture change, can be viewed as "partial explanation" at best. Binford's "organizational dynamics", on the other hand, is viewed by them, and by Binford himself, as representative of "middle-range" theory in that it advocates not only the study of how the archaeological record was formed (i.e. low-level theory), but also the explanation of why a past dynamic cultural system produced the static archaeological record of today (i.e. middle-range theory).

Goodyear et al. (1978), and especially Raab and Goodyear (1984), have recently discussed the concepts of "low-level" theory and "middle-range" theory in archaeology. As initially introduced into the archaeological literature by Raab and Goodyear (1973, cited in Raab and Goodyear 1984), "middle-range" theory was proposed as an approach which seeks to consolidate high-order theories with low-order empirical studies. However, the term "middle-range" theory as applied to Binford's "organizational-dynamic" approach by Willey and Sabloff (1980), and in some instances by Binford himself (e.g. Binford 1977, 1981b), is somewhat ambiguous, in that while such theory serves as a bridge between static facts of the archaeological record and the behavior that produced it, it does not suggest the level or scale on which such theories operate. As such, Raab and Goodyear (1984:261) note that "It is difficult to see significant differences between so-called lower-level theory and middle-level constructs" and further that "...Willey and Sabloff's "lower-level theory" and "middle-level theory" both seem to refer to the central methodological problem of dealing with material traces." Instead, they suggest that only

> when we cease to ask merely what kinds of behaviors can be linked to certain records and start to ask why the behaviors in question came into existence, changed, or remained stable, [will] ~~we~~ approach meaningful theory-building. To date, most treatments of site formation processes have been carried out at a mechanical level and easily related to principles

> already extant in biology and the physical sciences... (Raab and Goodyear 1984:263)

The above discussion is not merely an exercise in semantics. Clearly, distinguishing between an approach based on "low-level" theory (i.e. a "reconstructionist" approach) and one based on "middle-range" theory (*sensu* Raab and Goodyear) is crucial. The former is essentially a methodology in that while it allows detection of patterning in human behavior, taken by itself it will lead only to trivial "explanations". The latter approach, on the other hand, requires in addition complementary formulation and testing of propositions which attempt to explain cultural dynamics.

Accordingly, the present chapter will proceed along the premise that the archaeological correlates of the organizational strategies involved in the maintenance of collecting and foraging subsistence-settlement systems can be defined in terms of the resource scheduling, site placement, and demographic arrangement associated with the respective strategies. This follows the distinction between methodological and explanatory levels of analysis in archaeology as differentiated by Raab and Goodyear (1984), and Binford's (1981a) view of the archaeological record as the patterning resulting from the organizational dynamics of cultural systems. Consequently, a series of test implications will be developed based on the causal relationships identified earlier (Chapter 1) and relating the archaeological correlates to changes in resource scheduling due to changes in the resource structure, and changes in technology. This strategy, through the conversion of a theoretical argument into a series of derivative propositions relating to a set of archaeological phenomena and thereby assigning meaning to those phenomena, should constitute a legitimate test of the hypotheses generated in Chapter 1.

Archaeological Correlates of Collecting and Foraging Systems

Correlates can be defined as principles or statements that relate behavioral variables to variables of material objects, spatial relationships, organization, and environment (cf. Hill 1970:63; Schiffer 1976:13). Accordingly, archaeological correlates can be defined as principles or statements relating behavioral variables of past cultural systems to the present static archaeological record. Determination of archaeological correlates, however, does not necessarily, and in fact rarely does, follow directly from what Schiffer (1976:44) refers to as equivalency transformations, which assert a one-to-one correspondence or identity between systemic and archaeological context. Instead, both cultural and noncultural formation porcesses, as noted previously, must be considered and appropriate transformations defined. It should be stressed that, while justification for the various transformations to be employed will be presented, they are based on ethnographic analogy, ethnoarchaeological studies, and, in the absence of relevant data, "invention". Furthermore, while some researchers (e.g. Gould 1978, 1980) have cautioned archaeologists against the use of uniformitarian assumptions to infer past behavior, the present study proceeds along the premise that, as noted recently by Binford "...any inference, even a simple identification, to the past must make a uniformitarian assumption" (1983:422, emphasis in original).

From the preceding discussion, it is clear that archaeological correlates can, and must, be examined from both the "site specific" behavioral perspective as that behavior relates to the organizational dynamics of a cultural system and from the "slow time" or palimpsest perspective. This section will first discuss the archaeological correlates at the "site specific" behavioral level, and then from the palimpsest perspective.

Site Specific Correlates

Since the behavioral variables of primary interest to the present study are those relating to resource procurement scheduling, site placement, and demographic arrangements, "observation units" of direct relevance include feature and site types, site size, site location, site arrangement, and ecofact characteristics.

Feature and Site Type

In discussing the differences between foraging and collecting strategies, Binford (1980) noted that the former results in two basic site types: residential bases and locations. Collecting strategies, in addition to residential bases and locations, result in three further site types due to the logistical nature of their procurement strategies: field camps, stations, and caches.

1. Residential bases. Residential bases form the "hub" of subsistence activities, with foraging parties originating at these localities, and most processing, manufacturing and maintenance activies being conducted there.

Due to the lower residential mobility of collectors, however, residential bases associated with such groups will tend to represent greater expenditures of energy in dwelling and related feature construction and maintenance (compare for example the semisubterranean dwellings of the North Alaskan Eskimo "collectors" [Spencer 1959:49] with the snow dwellings of the Copper Inuit "foragers" (Jenness 1922:59-75). Furthermore, because more permanent residential sites are often the locations of formal resource redistribution and hunting-related ceremonialism, specific features related to such behavior are typically associated with such sites. In the essentially sedentary Tareumiut communities, for example, specialized permanent features (i.e. *Karigi*) are associated with each whaling unit or crew (see Spencer 1959:177-180), while in the smaller and more mobile Nunamiut residential camps, only one such feature is normally present, and is of a temporary nature (Spencer 1959:48-49).

2. *Locations*. Locations are places where extractive activities are carried out, and include terrestrial and sea mammal 'kill' localities; fishing localities; and wood, metal, lithic and raw material procurement localities. Although both collecting and foraging systems are characterized by locations, those associated with the latter tend to be primarily "low-bulk" extraction localities, while those associated with the former are typically "high-bulk" extraction localities involving relatively sophisticated procurement strategies (Binford 1980), as well as "low-bulk". Examples of "low-bulk" localities include kill sites of single, or a few, caribou or musk-oxen, seal kill sites, and

hunting blinds (see for example Mathiassen 1928; Rasmussen 1931; Balikci 1970). "High-bulk" locations, on the other hand, will include features typically associated with sophisticated, logistically organized hunting techniques such as caribou drive systems (e.g. Rasmussen 1931; Balikci 1964, 1970; Fitzhugh 1981), fishing weirs (Balikci 1970), and whale "haul-out" and flensing localities (Spencer 1959; Savelle 1984).

3. Field Camps. A field camp is defined as a "...temporary operational centre for a task group. It is where a task group sleeps, eats, and otherwise maintains itself while away from the residential base" (Binford 1980:10). Examples of field camps include caribou-hunting field camps, fishing field camps, and whale-hunting field camps.
4. Stations. Stations are associated with intercept strategies as opposed to encounter strategies, and include hunting stands such as the Mask Site described by Binford (1978b), where "...special purpose task groups are localized when engaged in information getting, for instance game movement..." (Binford 1980:12).
5. Caches. Caches are common components of collecting systems, and represent temporary storage facilities for bulk items that are afterwards transported to the consumers, or alternately, they may represent storage facilities at which consumers gather and establish residential bases (see Chapter 1).

Site Size. The number of features utilized at any one time will be a direct reflection of the site population and/or extent of particular activities related to those features. While foraging groups can be expected to maintain relatively small camp sizes to minimize the rate of resource depletion within a camp's "catchment" area, sedentary or semi-sedentary collectors do not have the same restrictions, and this, combined with resource surpluses, allows generally greater population levels amongst the latter. A straight equivalency transformation, however, will be applicable only if the site has not been occupied or utilized prior to, or subsequent to, the time period in question. Although in some instances such conditions would be likely, in other instances they would not. The effects of reoccupation or reutilizaton of sites will be discussed in detail in the section dealing with the palimpsest perspective.

An alternative approach to site size was utilized by Yellen (1977), who determined that site size, at least amongst foraging groups, was related not to population directly but rather to length of occupation. However, site size in this instance relates to both residential features and midden areas. By site size, in the present study, is meant the number of features within a site, rather than overall size, midden depth or areas, or any other possible criterion.

Site Location

Site location models in recent years have tended to emphasize site placement in terms of general adjacent "subsistence areas" accessible from the site itself. That is, site location is seen as a direct function of the nature of local and regional resources, and include site catchment models (e.g. Vita-Finzi and Higgs 1970; Roper 1979), "gravity" models (e.g. Jochim 1976; Crumley 1979), "optimal" location (e.g. Wood 1978), and so-called "polythetic-satisficer" models (e.g.

Williams et al. 1973; Thomas and Bettinger 1976). However, such models tend to account for the interaction between economic zones and residential bases only; i.e. what Binford (1982) has referred to as the "foraging radius". Locational analysis in this regard will thus be applicable only to foraging systems. Collecting systems, on the other hand, must also be examined from the standpoint of a "logistical" zone; i.e. the zone exploited by task groups operating out of field stations. Accordingly, in foraging systems site locational patterns will tend to consist of a series of residential bases with associated locations at or near resource concentrations. In collecting systems, residential bases will be more widely dispersed and situated at primary caching localities (related in turn to primary resource concentrations); while between and peripheral to the residential base camps and locations will be a number of field camps, smaller caches, and stations (Binford 1982). These differences are illustrated in Figure 14.

Internal Site Arrangement

Internal site arrangement has often been utilized as a criterion of social differentiation and integration amongst both nomadic and sedentary societies (see for example Chang 1958, 1962; Deetz 1965; Trigger 1968; Hill 1968, 1970; Dickens 1978; Muller 1978; Flannery 1976). Such studies are typically based on the assumption that the distribution of features within a site are a reflection of the social or organizational components of the culture represented by the site. Levi-Strauss, for example, noted that "...in many parts of the world there is an obvious relationship between the social structure and the

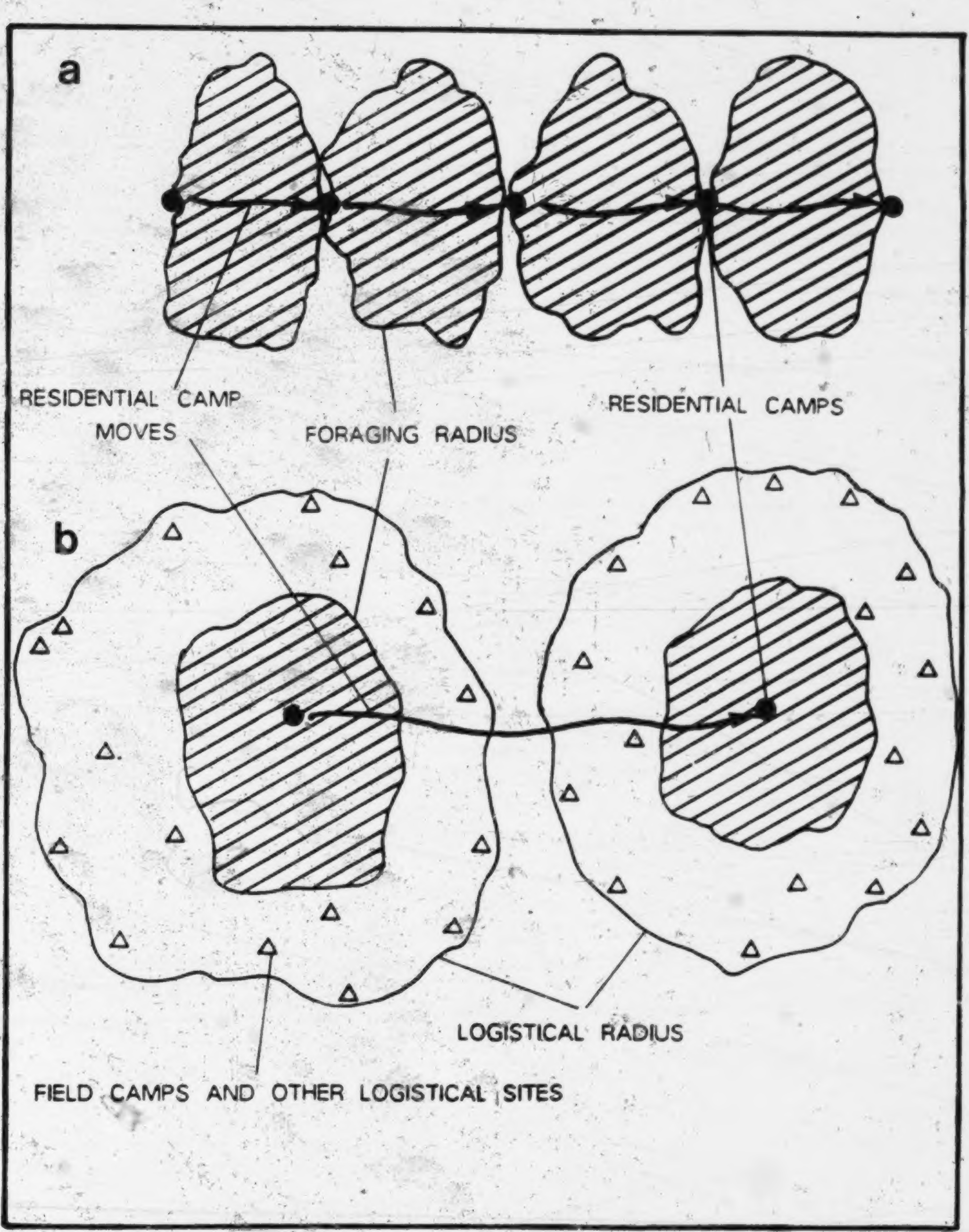

a
RESIDENTIAL CAMP MOVES
FORAGING RADIUS
RESIDENTIAL CAMPS
b
LOGISTICAL RADIUS
FIELD CAMPS AND OTHER LOGISTICAL SITES

Figure 14. Idealized patterns of economic zones associated with (a) foraging systems and (b) collecting systems. After Binford 1981a.

spatial structure of settlements, villages, or camps", since, in part "...spatial configuration seems to be almost a projective representation of the social structure" (Levi-Strauss 1953:533-534, cited in Chang 1962:37).

Chang (1962) has referred to the feature arrangement within a site as the "community pattern", while reserving the term "settlement pattern" to refer to the "locality of the societal occupation in relation to the natural environment, technology, and subsistence" (1962:28). Chang distinguished two broad "northern" (or circumpolar) community pattern types: "Siberian" and "Eskimo". Siberian community patterns take the form of multi-dwelling villages with planned oriented layouts, or as villages consisting of a single or small number of communal houses. Such patterns are typically associated with communities consisting of a more or less permanent membership determined by birth, marriage, and occasionally adoption. Eskimo community patterns, on the other hand, are characterized by an irregular community layout and are associated with small groups of loosely organized households with flexible membership requirements, and apparently lack an explicit tendency for a symbolically oriented settlement layout. Although Chang differentiated effects of the environment, technology and subsistence and considered them unimportant in "community pattern" analysis, an ecological approach as followed in the present study would suggest that such patterns may be more closely related to the organizational components of a society with regards to hunting crew or group membership, distribution of surplus resources, and/or formalized social control. Accordingly, the more structured "Siberian" pattern would tend to be related to sedentary or semi-sedentary residential bases of collectors, where resource surpluses, logistically organized hunting crews, and larger populations with the potential for corresponding intragroup conflict, would be expected (c.f. Renouf 1984). The less structured "Eskimo" pattern would tend to be related to the more mobile, less logistically organized residential bases of foragers.

Ecofact Characteristics

General approaches to the study of faunal remains in archaeological contexts for the interpretation of subsistence behavior have been outlined by Medlock (1975), Binford (1978a), Wing and Brown (1979), and Lyman (1982), among others. Medlock (1975) was one of the first to stress the importance of the recognition and analysis of taphonomic histories (including cultural) of faunal assemblages, and suggested four methods of approaching the study of these histories:
a) improved techniques of analysis,
b) experimentation, c) analogy, and d) simulation research. As noted by Lyman (1982:340-341), the first involves primarily the investigation of various quantitative techniques, while the remaining three methods involve what have been termed "actualistic" studies (Gifford 1981; Binford 1981b). Certainly the most useful of recent actualistic studies in the study of hunter-gatherer systems have been those by Binford (1978a, 1981b). According to Binford, the Nunamiut Eskimo system, which he uses as a model for collecting systems, is characterized by strategies to

> "...increase a) the time utility of resources (storage), b) the space utility of resources (logistics), c) the consumer utility of resources (sometimes complicated serial or use differentiation among food sources) and d) the social

> utility of resources (viable patterns of sharing and mutual aid that frequently resulted in a kind of time-and-space banking strategy for access to resources already socially incorporated by others)." (1978a:458)

Accordingly, Binford suggested the following general propositions:

> 1. The greater the distance over which meat is to be transported, per unit of time, the more radical will be the culling of low-utility anatomical parts along the transport route.
> 2. The greater the bulk of material to be transported, per unit of time, the more radical will be the culling of low-utility anatomical parts along the logistical route. (Binford 1978a:459).

From the above propositions, it can be seen that, other conditions being equal, high-bulk, logistically-organized collecting systems will be characterized by relatively high-utility faunal elements at residential sites, moderate-utility elements as residual cache items, and low-utility elements at kill and processing sites. Foraging systems, on the other hand, will be characterized by comparatively less radical culling within the foraging radius. These relationships also serve to outline, in part, the rationale for the relative decrease in diet breadth among collectors.

The equality of "other conditions", however, cannot be assumed with respect to one important aspect: specifically, dogs. As discussed by Binford (1978a:214-217, 330-332, 442-445), dogs are typically fed low and medium utility elements, with the result that radical culling seen in residential sites may be attributed to an increased use of dogs rather than the requirements of logistical transportation. In the latter case, however, there would not be a corresponding presence of low and medium utility elements at caches and locations.

Palimpsest Correlates

As noted previously, the archaeological record can in many instances be considered a palimpsest of derivative material from a series of different occupational or utilizational episodes. Accordingly, there are no necessary or direct associational relationships between various materials at an archaeological site, unless the cultural depositional events are of such "high energy" that burial units can be directly equated with human actions (Binford 1981a:197, 1982:16).

Although the archaeological consequences of "site development" have been investigated in detail in primarily sedentary groups (see e.g. Hill 1970; Plog 1975; Longacre 1976), very few such studies have been devoted to hunter-gatherer sites. However, it can be suggested that there will be a tendency to reoccupy or reuse features or materials sequentially. Furthermore, the more energy expenditure required for the construction of a feature, the more likely the feature will be reused or reoccupied. However, it can also be anticipated that not every reuseable feature will in fact be reused. Accordingly, the proportion of "redundant" features increases with increasing reoccupation and/or reutilization and, as such, absolute site size will increase. Thus, while absolute residential unit estimates, or estimates of other feature-associated activities may not be possible, relative estimates, based on feature number or size, are comparable. Furthermore, it can be seen that the smaller the site size, the closer will be the approximation to contemporary feature utlization. These relationships are represented in Figure 15.

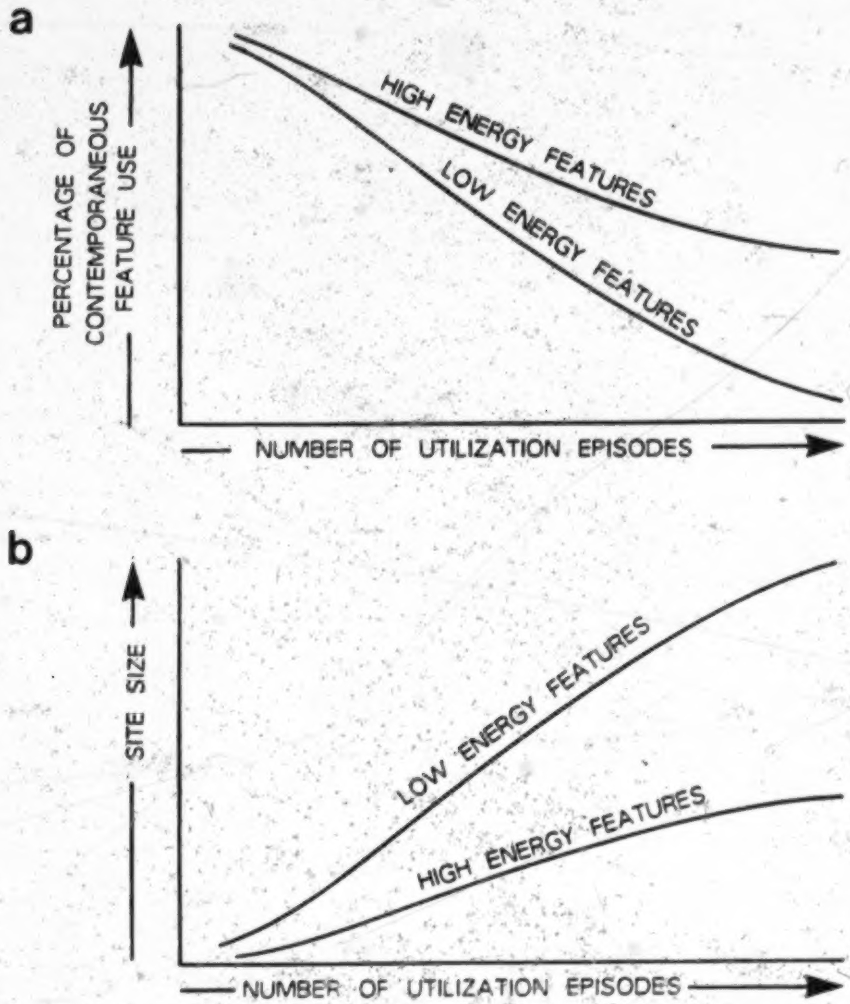


Figure 15. a) Relationship between contemporaneous feature use and utilization episodes of low and high energy features, assuming constant utilization intensity. b) Relationship between site size and utilization episodes, given the relationships established in 15(a) above and assuming constant utilization intensity.

Since foraging systems emphasize widespread coverage of areas through an "encounter" strategy and collecting systems emphasize "intercept" strategies, redundancy of site occupation or utilization can be expected to vary accordingly. Specifically, sites associated with foraging systems (residences and low-bulk locations) can be expected to show less redundancy, while collecting systems, because of their encounter strategy at specific "high-bulk" locations, will show greater occupational and utilization redundancy. This occupational and utilization redundancy will in turn affect intersite variability. For collecting systems, since larger residential sites are associated with high-bulk locations and caches, and thus greater occupational redundancy, intersite variability will be considerable. For example, large cache sites of collectors may be expected to be associated with large residential sites and/or high-bulk locations. Smaller caches, on the other hand, can be expected to be isolated, or occasionally, but not consistently, associated with other site types. For foraging systems, relatively low site occupational redundancy, as well as low initial variability in site type, will result in relatively low intersite variability. These relationships are illustrated in Figure 16.

Test Implications

Given the hypotheses advanced in Chapter 1, and the archaeological correlates of relevant hunter-gatherer behavior, this section will propose a series of test implications, or propositions, that should obtain if the postulated causal relationships and responses are

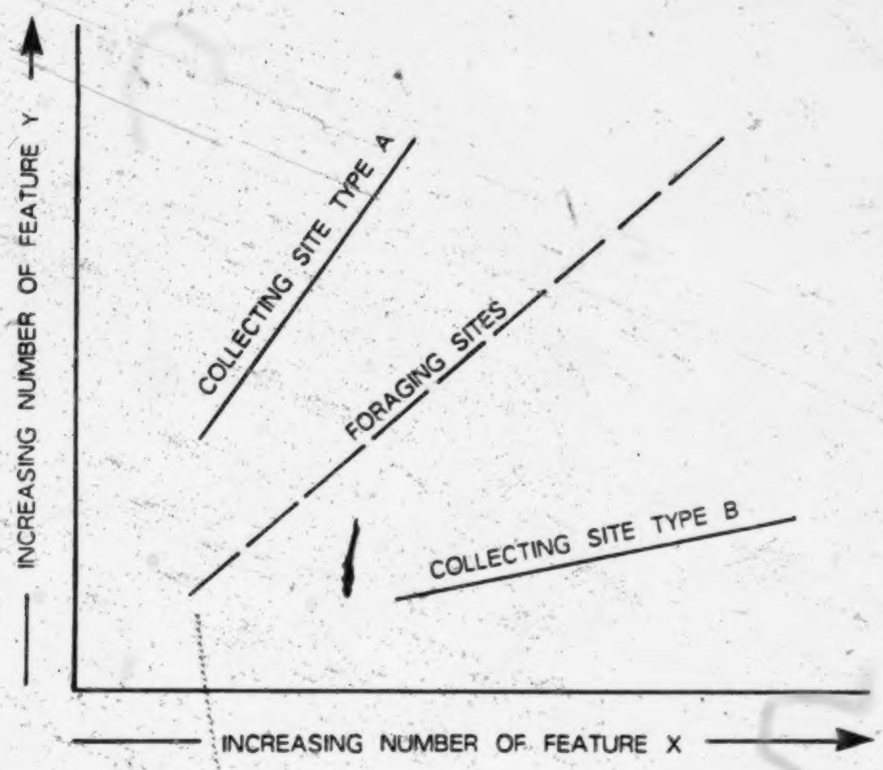

INCREASING NUMBER OF FEATURE Y
COLLECTING SITE TYPE A
FORAGING SITES
COLLECTING SITE TYPE B
INCREASING NUMBER OF FEATURE X

Figure 16. An example of differences in overall site variability between collecting and foraging systems. Regardless of site size, the relationship between features X and Y remain constant for sites containing those feature types in foraging systems, while for collecting systems changing relationships are equated with a change in site type.

correct. It should be stressed here that for the historic period ethnohistorical documentation will be utilized, when appropriate, to support conclusions derived from the archaeological data. However, the archaeological data are still considered crucial, since, as discussed previously, the ethnographic/ethnohistoric "quick-time" perspective may fail to record fully organizational responses to environmental or technological change. Furthermore, it should be noted that while the test implications are necessarily presented in qualitative terms, they nevertheless allow comparisons of direction of change according to the stated hypotheses.

Finally, to provide a chronological framework, Neoeskimo sites and/or components relating to the period of maximum bowhead whale distribution and abundance are referred to as "classic" Thule. This follows McCartney (1977) and Sabo (1981), who have defined this term on the basis of sequences in other areas. Although this "chronological" definition is subsistence-based, changes in material culture characteristics have traditionally been closely associated with changes in subsistence economies (see for example McGhee 1972; Schledermann 1975; McCartney 1977; Sabo 1981). Extending this concept to the southern "caribou" area, "classic" Thule refers to those sites and/or components relating to the period of probable maximum caribou distribution and abundance, and is comparable in age to "classic" Thule elsewhere. "Modified" Thule refers to those sites and/or components following the decline of maximum bowhead whale and caribou abundances, and extending up to the beginning of the historic period in the study area (1829). The historic period is defined as the period from 1829 up to the establishment of government housing in permanent settlements, and is further divided into an "early" phase, which includes the period up to the time of the establishment of Hudson's Bay Company posts and the corresponding widespread use of the rifle, and a "late" phase, which includes the period following the beginning of widespread use of the rifle.

HYPOTHESIS 1

> A decrease in the distribution and abundance of bowhead whales in the northern part of the study area, and of barren ground caribou in the southern part of the study area, will be accompanied by a transformation of subsistence-settlement systems based primarily on collecting strategies to subsistence-settlement systems based primarily on foraging strategies.

Test Implications:

1. There should be a strong functional separation of Classic Thule sites into residential bases, high-bulk locations, field camps, caches, and stations, and this functional separation should decrease in Modified Thule and early Historic sites.
2. Intersite variability should be relatively high for Classic Thule sites and decrease for Modified Thule and early Historic sites.
3. Classic Thule site patterns should exhibit recognizable foraging and logistical zones, and the foraging zones (defined from residential bases) should be associated primarily with high-bulk locations and caches. Modified Thule and early Historic site

patterns should exhibit less of a tendency toward logistical zonations and instead approximate a continuous series of foraging zones.

4. Classic Thule site placement patterns should emphasize, and be related to, bowhead whale procurement locations in the north and caribou procurement locations in the south, and secondarily to other "critical" resources in the respective areas. Later site placement patterns should tend to emphasize, and be related to, secondary resources.
5. Classic Thule residential sites should be relatively permanent (i.e. season-long, annually-repeated occupations), and should be associated with high-bulk locations. Modified Thule and early Historic residential sites, on the other hand, should be of a more temporary nature and show less association with high-bulk cache sites and/or high-bulk locations.
6. Classic Thule sites should be internally relatively highly structured while later sites should show a trend toward decreasing internal site structure.
7. There should be a trend to decreasing residential site size from Classic Thule to Modified Thule and early Historic sites.
8. Diet breadth as reflected by faunal remains should be relatively narrow at Classic Thule sites and relatively high at Modified Thule and early Historic sites.
9. High-bulk resources at residential sites should show greater culling of low utility elements at Classic Thule sites and less at Modified Thule and early Historic sites; locations and caches should show progressively greater culling o1 high and medium

utility elements for transfer to residential sites.

10. Faunal remains at Classic Thule residential sites associated with high-bulk resources should indicate relatively extended seasonal occupations, while those at Modified Thule and early Historic residential sites should indicate relatively short seasonal occupations.

HYPOTHESIS 2

> The introduction of the rifle will be accompanied by a transformation of a subsistence-settlement system based on a foraging strategy to a subsistence-settlement system based on a collecting strategy, but one which lacks specialized procurement techniques.

Test Implications

1. There should be a greater functional separation of late Historic period sites into residential bases, high-bulk locations, field camps, caches and stations than for sites associated with preceding Modified Thule and early Historic periods.
2. Intersite variability should be relatively higher for late Historic period sites than for the preceding Modified Thule and early Historic sites.
3. There should be a trend from site patterns exhibiting a continuous series of foraging zones during the Modified Thule and early Historic periods to site patterns exhibiting recognizable foraging

and logistical zones during the late Historic period.

4. Late Historic site placement patterns should emphasize, and be related to, the primary critical resources of caribou, seal, and fox, as opposed to a more general pattern during the preceding Modified Thule and early Historic periods.
5. Late Historic residential sites should be relatively permanent or semi-permanent, and should show a greater association with high-bulk locations and caches than Modified Thule and early Historic sites.
6. Internal site structure should remain relatively unchanged from the Modified Thule and early Historic period to the late Historic period.
7. There should be a trend to increasing residential site size from the Modified Thule and early Historic period to the late Historic period.
8. Diet breadth as reflected by faunal remains should be relatively narrow at late Historic sites in comparison with Modified Thule and early Historic sites.
9. High-bulk resources at late Historic residential sites should show greater culling of low- to medium-utility elements in comparison to those at Modified Thule and early Historic sites. This should not, however, be accompanied by a corresponding increase in low- to medium-utility elements at caches and locations.
10. Faunal remains at late Historic residential sites associated with high-bulk resources should indicate relatively extended seasonal occupations, while those at Modified Thule and early Historic sites should indicate relatively short seasonal occupations.

It should be stressed that while the test implications for hypothesis 2 should ideally be restricted to the early and late Historic periods, the necessary detailed field investigations to differentiate late Modified Thule from early Historic sites/components were not possible given the nature of the project. However, since according to the stated hypotheses, both Modified Thule and early Historic subsistence-settlement systems should be based on foraging strategies, combining sites from the two periods allows comparison of much larger sample sizes without compromising proposition validity. This is not to suggest that indirect or direct contact with European or Euro-American explorers and/or whalers prior to 1923 did not, or could not, affect significantly various aspects of indigenous Inuit society (see e.g. Hickey 1979, 1984; Savelle 1985). Based on present evidence, however, there do not appear to have been significant changes in actual subsistence-settlement systems, intergroup geographic boundary change notwithstanding.

CHAPTER FOUR:

METHODOLOGICAL CONSIDERATIONS

The determination of analytical units is directly dependent upon the variables identified in the formulated propositions (test implications), since, as noted by Binford (1968:24)

> Intuitively established analytical units, whose significance is not specified, can at best be of limited utility in testing hypotheses. For in hypothesis testing we must always be able to justify our observations as relevant measures of the variable identified in the proposition we have formulated.

Hill has also outlined the futility of unstructured data collection, and makes the point that "...we cannot collect data efficiently without hypotheses. Hypotheses are bridges between problems and data, and provide explicit frameworks for interpretation..." (1972:63). Accordingly, the analytical units established for the present study are derived from the archaeological correlates defined in the previous section, and as such, should transcend the level of "arguments of relevance" (Binford 1983:160) and apply directly to "explanatory arguments" (*op. cit.*). Furthermore, in maintaining the strategy adopted in the preceeding section, uniformitarian assumptions are made with regard to technofunctional and sociofunctional realms (cf. Binford 1962).

Given the test implications presented previously, the relevant analytical units to be examined are those relating to 1) feature and site type, 2) site size, 3) intersite variability, 4) internal site structure, 5) site situation and intersite association (i.e. foraging vs. logistical radius), 6) site seasonality, 7) diet breadth,

8) culling characteristics, and 9) site age.

1) Feature and Site Type

a) Residential Sites. Historically, residential features associated with Thule Eskimo and Historic Inuit groups included true semisubterranean dwellings, qarmang, skin tents, canvas tents (post-1923), and snow dwellings.

1. Semisubterranean dwellings: Semisubterranean dwellings were typically deep, constructed of stone, sod, and locally whalebone or wood, with recognizable "cold-trap" entrances. Such dwellings were utilized historically in Alaska (Spencer 1959, 1984), in Labrador (Bird 1945; Taylor 1984), in Greenland (Kleivan 1984), and on Southampton Island (Taylor 1960), and an example is represented in Figure 17. Prehistoric use of such dwellings (during the early Thule period) has been established throughout the western, central, and eastern Arctic (see e.g. Mathiassen 1927a,b; Holtved 1944; Ford 1959; Taylor 1972; Schledermann 1975, 1976a, 1976b; McCartney 1977, 1979a; Taylor and McGhee 1979, 1981; Maxwell 1981; Sabo 1981; Yorga 1982; McGhee 1984). Historically, semisubterranean dwellings were associated with permanent residential villages which were typically occupied during the entire winter, serving as bases for logistically organized task groups.

2. Qarmang: Mathiassen (1927b:133) described qarmang ("qarmaq") as "...purely temporary dwellings which are most often built of snow, but sometimes of ice or stones and turf". The purpose of such structures was "...to fill in the unpleasant period in the fall from

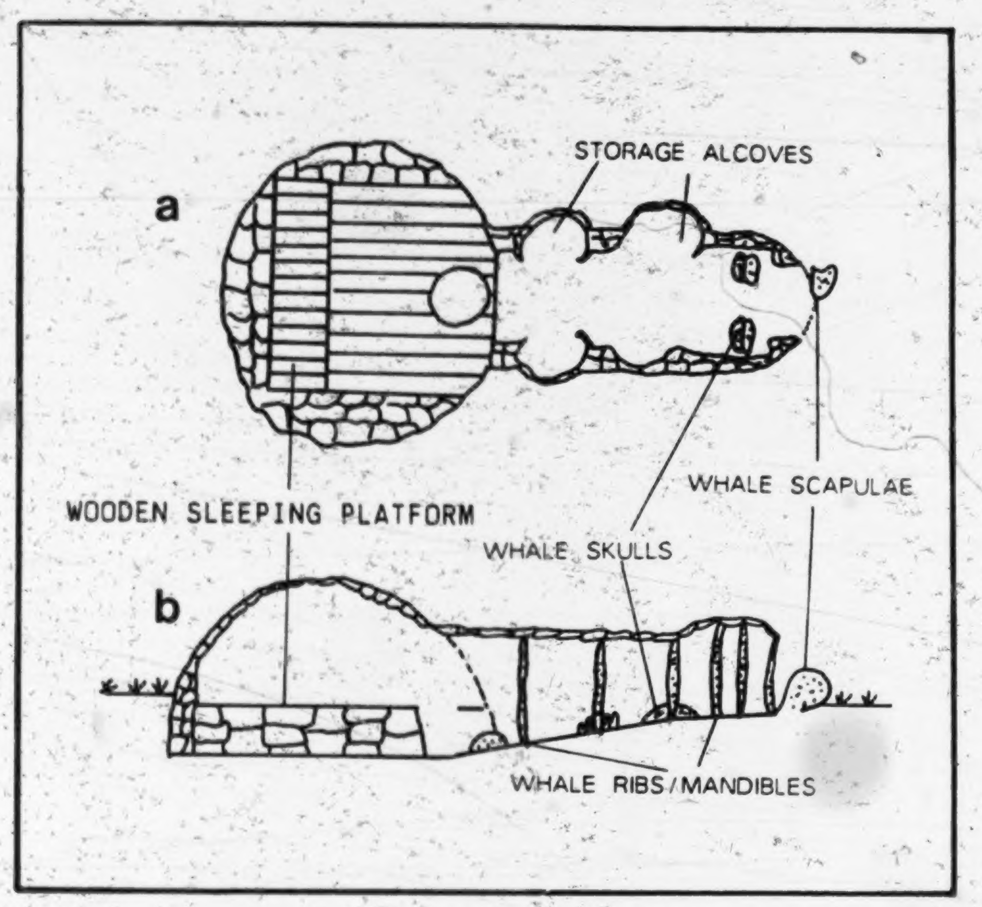

a
STORAGE ALCOVES
WHALE SCAPULAE
WOODEN SLEEPING PLATFORM
WHALE SKULLS
b
WHALE RIBS/MANDIBLES

Figure 17. Tareumiut Eskimo semisubterranean dwelling; a) plan, b) cross section. After Spencer 1959.

the time when the tent becomes too cold until snow becomes firm enough to be suitable for building snow houses, a period that is rarely longer than a month or so..." (op. cit.). Mathiassen was the first to suggest that such features were "superfluous" to the true semisubterranean dwellings and post-dated such features in most parts of the Arctic. Schledermann (1976a) has discussed the transition from semisubterranean dwellings to qarmang in detail. Historically, qarmang were entirely above-ground structures (see for example Clarke 1979:133-134) or, when constructed over previously existing semisubterranean dwelling ruins, partly below ground, but in such cases lacked the characteristic cold trap entrances and sod roofs of true semi-subterranean dwellings (see for example Mathiassen 1927a:133-139).

Although true semisubterranean dwellings have been distinguished from qarmang, "transitional" types between the two styles can be expected. For the purposes of the present study, such transitional types will include those structures with small, shallow entrance passages and shallow main chamber construction with or without evidence of solid (sod and stone or wood/bone) roofs.

3. Snow dwellings: Snow dwellings were an important architectural form amongst most Inuit groups in the central and eastern Arctic during Historic times, and were typically occupied during the late fall through to early spring. During the major part of this period, the snow dwellings were in the form of the typical "igloo" consisting of snow walls and roof, snow storage and entrance passage, and snow "furniture" (raised sleeping platform and raised side benches), as described and illustrated by Jenness (1922:59-75),

Mathiassen (1928:118-131) and Boas (1964:132-135), among others. During the early spring and late fall, snow dwellings were often modified according to changing temperature and snow conditions. These modified structures consisted of a lower wall of snow and an upper wall and roof of skins (in some instances entire skin tents were erected on the lower wall of snow), and retained the snow storage and entrance passage and snow "furniture" (see for example Jenness (1922:76-79), Boas (1964:143), Balikci (1970:81)).

Snow dwellings are believed to be the predominant form of winter habitation in the central and eastern Arctic since approximately A.D. 1500, and were apparently at least in use, although less commonly, from the beginning of the Thule culture occupation in this area from approximately A.D. 1000. Evidence for their prehistoric use is based primarily on the occurrence of snow knives (e.g., Taylor 1968; Schledermann 1976a). It should be noted that McGhee (1983) has recently questioned the archaeological evidence for snow dwellings prior to the early historic period, and has suggested that tools traditionally identified as snowknives in fact functioned as flensing tools. However, Maxwell (1983), in reply, noted that such tools are generally too dull and blunt to have functioned as flensing knives, and are similar in style to ethnographically documented snowknives. Furthermore, Maxwell noted that flensing knives utilized by modern Inuit have readily identifiable counterparts in archaeological assemblages and that these differ significantly from the traditionally identified snowknives.

Despite the obvious importance of snow dwellings in Arctic prehistory and history, archaeological remains that can definitely be attributed to such occupations have not been reported. Remains associated with snow dwellings (and related features such as snow dog shelters) have traditionally been considered unrecognizable since typically many winter camps were located on the sea ice and their associated remains are therefore unrecoverable. Also, it has been assumed that even where such encampments were terrestrially based, the ephemeral nature of the snow dwellings, and of the ground surface of snow itself, would preclude their archaeological recognition. Unquestionably the first condition constitutes a legitimate restriction to the study of the remains of such dwellings. However, a study undertaken in conjunction with the present project has demonstrated that remains associated with terrestrially-based historic winter snow dwellings (and associated structures) are recognizable. The study (Savelle 1984) involved examination and interpretation of remains associated with two snow dwellings and three snow dog shelters occupied during the winter of 1958-59 at the Union River on Somerset Island. It utilized oral information on various cultural and natural formation processes associated with the site, supplied by the Reverend Andrew Atagotaluk, one of the site's original inhabitants.

As discussed in detail in Savelle (1984), "typical" snow dwelling remains consist of gravel deposits associated with sleeping platforms, bone concentrations corresponding to three-dimensional disposal systems, and the maintenance of original internal patterning of primary and secondary refuse (see Figure 18).

4. Tents: Tents utilized in the study area included skin tents (prior to the 1920's) and canvas tents (gradually replacing skin tents following the 1920's).

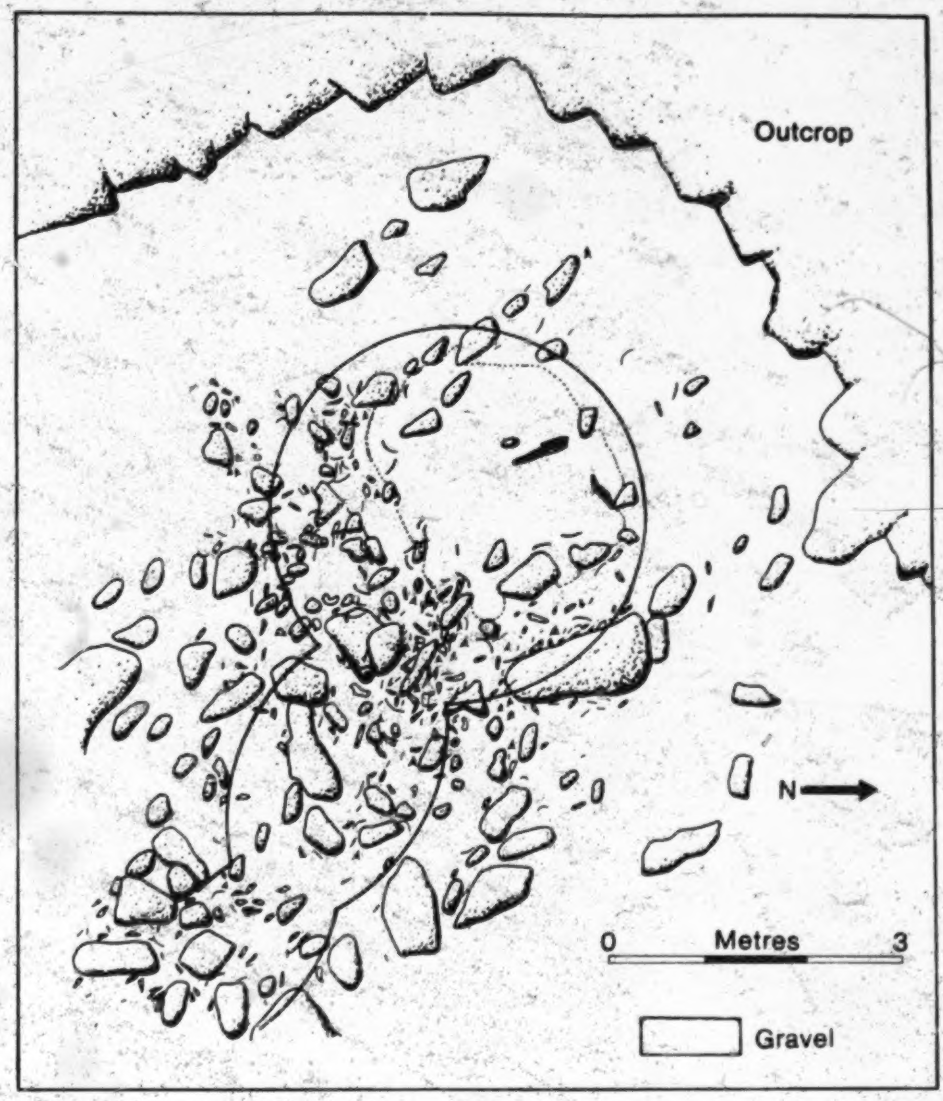


Figure 18. Distribution of artifacts and faunal remains associated with snow dwelling I2 at the Union River, Somerset Island, with superimposed plan of idealized snow dwelling. From Savelle 1984. Copyright Society for American Archaeology 1984.

Skin tents have been described often in the literature (see for example Huish 1835; Amundsen 1908; Jenness 1922; Mathiassen 1928; Rasmussen 1931; Spencer 1959; Boas 1964; Balikci 1970; Taylor 1974). Balikci described the construction of traditional Netsilik tents as follows:

> The tent was constructed by first placing large, squarish stones in a ring, thus marking out the floor size of the tent. Then a tent pole was erected in the middle of this circle, resting on a flag stone. At the upper end of the pole a number of sealskin thongs were attached, strongly fastened at the other ends to the heaviest of the ring stones. This constituted the frame of the tent, over which a sealskin tent sheet was stretched. The bottom part of the sheet was pulled tight and held solidly under the stone ring. Often additional stones were placed inside, leaning heavily on the outer ring and providing more stability to the tent...the housewife placed a line of flat stones all across the floor space, separating the sleeping area behind from the kitchen and work area in front, near the opening of the tent. (1970:26-27)

Upon site abandonment, the remains associated with such tents can be expected to resemble the 'heavy' tent rings described by Mathiassen (1927a:100-101) at Naujan, or, if fewer stones were utilized to weigh down the tent apron, a 'lighter' and more scattered tent ring can be expected.

A slightly different, but contemporaneous, style was noted by Huish;

> The summer tents of these people differ greatly from their winter ones. Their mode of erecting them, is, in the first place, to make a circle of stones, about seven feet in diameter: a pole is then placed upright, but not exactly in the middle: and to the top part of the stick are the skins attached, something in the shape of a marquee. The height of the tent is about 7 to 8 feet. (Huish 1835:523-524)

Tents constructed in this fashion and occupied in 1831 at Sheriff Harbour in Lord Mayor Bay are illustrated in Ross (1835:518), and the remains associated with two of the tents in Figure 19. The intact

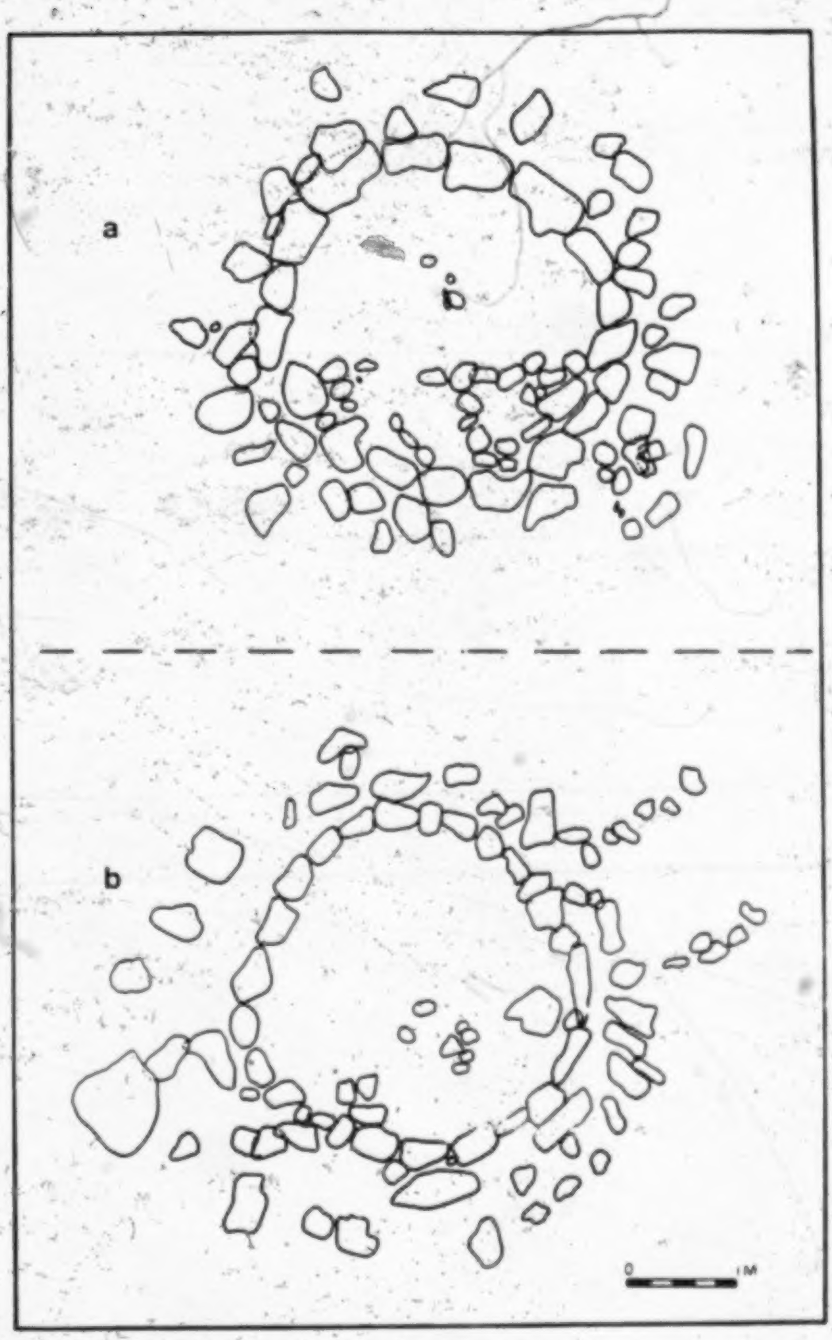


Figure 19. Plan of structural remains of two Netsilik Inuit tents erected and dismantled at Sheriff Harbour, Lord Mayor Bay in August 1831. See also Ross 1835:518.

inner circles of stone are readily evident,as are the scattered outer rings, which would tend to be scattered when the tents were dismantled. Furthermore, the partly paved kitchen and work areas can be distinguished in each, and the row of stones separating these areas from the sleeping area in tent ring 'a'. In the Netsilik region, the circular tent described above was utilized until the early 20th century, when a second style consisting of an 'H'-shaped cross beam on top of the pole was introduced from the Iglulik area (Balikci 1970:26). This resulted in an elongated tent, with a corresponding elongated tent ring remaining following site abandonment.

Finally, canvas tents, introduced into the Netsilik area in the 1920's and 1930's (Balikci 1970:xxiv) typically result in one scattered inner stone ring (from inner "hold-down" stones) and, if guy ropes are used, a scattered outer ring. Additional examples are given in Savelle 1983:124-125.

5. Karigi: A final type of structure associated with residential sites is the karigi. Amongst the Tareumiut of northern Alaska, such structures were in the form of large, permanent or semipermanent semisubterranean dwellings (occasionally above ground, resembling a qarmanq), and considerably larger than individual family dwellings (see e.g. Spencer 1959:50, 182-185). They lacked the customary sleeping platforms and instead often contained a series of low side benches (Simpson 1855:259; Spencer 1959:183). Further, and as noted by Spencer, the "...most distinctive characteristic of the karigi, one which reinforces its character as a ceremonial house, was the presence of any number of charms (aanaroat) on the walls, on the floor, hanging from the roof beams, etc.", all of which related to whaling

(1959:184). For an Alaskan archaeological example, see Hickey (1976:240). Amongst the Nunamiut, karigi were of a more temporary nature, and were utilized as required at the time of hunting assemblages (i.e. for ceremonies related to the caribou hunt) (Spencer 1959:182). Finally, although karigi were not used in the summer in northern Alaska, special tents and/or windbreaks were set up to serve as "men's houses" (Spencer 1959:184).

During the historic period in the eastern Arctic, formal karigi were not utilized. However, "dance houses" composed of several joined snow houses were often utilized during the major winter seal hunting aggregations (e.g. Balikci 1970:62-63).

b) Locations. As discussed previously, locations include kill and/or extractive localities. "Low-bulk" locations generally leave few archaeological remains. Kill sites of single or a few caribou, for example, might be identified by discarded low utility elements (see for example Binford 1978a:53-54; Plate 1b, this study). However, subsequent scavenger activity and decay would make such identifications extremely improbable. Also extremely difficult if not impossible to determine, are smaller seal kill locations, since the seals were traditionally killed on or under the sea ice and therefore do not leave associated faunal elements or features, and also because seals were apparently returned to base or field camps entire (see e.g. Balikci 1970:77; Plate 1a, this study). "Low-bulk" extraction localities that would be preserved include those with associated features, such as small caribou- or bird-hunting blinds, metal leg-hold and traditional stone fox traps, and raw material procurement localities (see Plates 2a and 2b).

In contrast to "low-bulk" locations, "high-bulk" locations exhibit much greater archaeological visibility. Such locations include major caribou fence and/or inukshuit systems (Balikci 1970:41-45; 1964:13), major caribou butchering sites (Binford 1978a:51-52; although as for "low-bulk" extraction localities, severe disturbance and decay can be expected), whale haul-out and butchering localities (see e.g. Kristof 1973:350-353; Spencer 1984:321; Plate 3a, this study), and when river conditions permit, fishing weirs (Rasmussen 1928:206; Balikci 1970:28-37; Plates 3b, 4a and 4b, this study).

c) Field Camps. Field camps, as discussed previously are temporary operational centers where task groups sleep, eat, and otherwise maintain themselves while away from the residential base. Associated site features will be very similar to those associated with temporary residential sites (e.g. tent camps and snow dwelling camps). Accordingly, primary archaeological features are tent rings or snow dwelling scatters. Based on the nature of features alone, field camps would in many instances be difficult, if not impossible, to distinguish from residential bases. However, site size is an important factor (see below), as is site variability (i.e. site variability will tend to be greater for residential sites than for field camps).

d) Stations. As discussed previously, stations are associated with intercept strategies, and are typically utilized for information gathering. Along with many "low-bulk" extraction localities, stations have relatively little archaeological visibility, since they generally lack site 'furniture' or other features and represent very temporary occupations (see Binford 1978b; Plate 5a, this study), characterized by what Binford (1978b:288) refers to as "boredom" activities (such modern activities include card playing, "crafts", cigarette smoking, etc.).

e) Caches. Historically, food caches were of five types; snow and/or ice (Balikci 1970:51), sod ice cellars (Spencer 1959:60), above ground stone cairns (Balikci 1970:37; Binford 1978a:240-241; Plate 5b, this study), large gravel depressions, usually on beach ridges (McCartney 1980:535-536; personal observation at Union River, Somerset Island 1980), and exposed above ground (Binford 1978a:49-50; Plate 6a, this study). Archaeological visibility of the snow and/or ice caches and the exposed above ground caches is exceedingly low, while for the remaining three types it can be expected to be relatively high.

f) Other Features. A number of other features can be expected to be found in association with the various site types, including burials, kayak rests and kayak pits, external hearths, meat and/or sled rests, drying rack supports, "play" dwellings and "play" kayaks, and skin and hide stretching outlines. While such information would be recorded, it is not of direct relevance to the present study.

2. Site Size

Site size has traditonally been employed as a means of determining population size. Ethnographically-based techniques previously utilized include the determination of roofed floor space (e.g. Naroll 1962), the number of individual dwellings (e.g. Hill 1970), total site area (Weisner 1974; Yellen 1977), and volume of site midden deposits (e.g. Ammerman et al. 1976). Although all such studies have their limitations (see e.g. Hassan 1978 for a detailed review), for the present study if the length and type of occupation can be estimated, as well as the 'energy level' of the feature type, then the population units represented by the sites should be comparable. For example, winter residential sites of semisubterranean dwellings will be comparable to other occupations for similar time periods, but would not be directly comparable to temporary summer residential sites indicated by tent rings. Similarly, summer residential sites cannot be compared directly to summer field camp sites, since the number of occupational episodes, even over a relatively short period, is expected to be higher than for the former. This is directly related to the functions of the respective sites. Summer residential sites are typically located so as to provide access to seasonal resources for the sites' inhabitants. Such sites will be placed such that they satisfy not only the spatial requirements to efficiently harvest the target resources, but also transportation requirements and secondary resource requirements such as fuel, fresh water, etc. Accordingly, such sites will tend to be located consistently at favoured localities according to the season. Summer field camps, on the other hand, represent temporary encampments by groups of hunters/collectors actively monitoring a large logistical zone, and operating out of the aforementioned summer residential camps. The actual period of time spent at such camps is short relative to that spent at the residential camps out of which they operate. Furthermore, because the secondary requirements at field camps are not as constraining, there is less likely to be consistently repeated occupations of any one field camp site.

From a different perspective, the nature of the different logistically-related activities allows differentiation of sites associated with those activities on the basis of site size; specifically, temporary residential sites vs. temporary field camps. Residential sites are composed of various compositions of family units, while field camps, although they may also occasionally involve family units, are typically composed of specialized task groups. As Damas (1968, 1969b), and various contributers in Lee and Devore (1968) have noted, the minimal residential economic unit of hunter-gatherer societies tends to approximate 20-25 persons. In the Arctic regions, smaller family residential groups have been reported for the Copper Inuit (see e.g. Jenness 1922:121-144; Damas 1969b:47) during the summer months, but this is apparently a unique instance.

The number of dwellings associated with groups of 20-25 persons would of course vary to some extent, but three-four dwelling units appears to be the most frequent for central Arctic Inuit groups (see e.g. Parry 1824:271; Ross 1835:518, 581; Jenness 1922:85, 142). Specific task groups, however, while certainly maintaining camps of four or more dwelling units on occasion (for example whaling camps - see e.g. Spencer 1959:336-337, Pl.5a), often maintained field camps of only one or two structures for up to eight or nine task groups members (Spencer 1959:178). Furthermore, much of the logistics in transportation of harvested animals and animal parts, caches products, etc., can be expected to be carried out by one-tent task groups of perhaps two-four persons.

From the above discussion it can be seen that while residential sites associated with either collecting or foraging systems will tend to consist of a minimum of three-four residential structures, task group field camps (associated primarily with collecting strategies) will often consist of one or two dwelling structures only. Accordingly, for the purposes of the present study, sites consisting of only one or two dwelling features, unless there are indications to the contrary, will be considered as task group field camps.

3. Intersite Variability

Intersite variability was previously discussed in the context of occupation and utilization redundancy. To avoid merely duplicating observations related to the variability in site size (Implication No. 7) and site function (Implication No. 1), however, comparison of intersite variability between collecting and foraging systems is most meaningful if applied specifically to ratios of caches to tent rings (expressed as caches/tent rings) according to increasing site size. Such comparisons incorporate occupation redundancy of "low-energy" features used throughout the entire Classic Thule to late Historic sequence in the study area, as well as differential site utilization, both of which are related to the collecting vs. foraging distinction. Accordingly, since foraging systems are characterized by group fission and fusion in direct relation to the resource structure, the cache/tent ring ratio should remain constant with increasing site size. Collecting systems, on the other hand, since they rely to varying degrees on high-bulk caching, should show higher ratios associated with larger residential sites, and lower ratios associated with smaller residential sites and field camps.

4. Internal Site Structure

For purposes of the present study, internal site structure can be considered random, clustered or regular. This follows the settlement pattern morphological scheme presented by Haggett (1965:89), except that regular in the present study refers to a linear and/or parallel arrangement as opposed to a hexagonal arrangement. Although various mathematical analytical procedures have been suggested for such arrangements (see e.g. Dacey 1962), such analyses would appear to be unwarranted for the present study, since local topographic/ physiographic conditions would potentially increase the variation to the point that visual, subjective estimates would approach the same degree of reliability.

A suggested 'hierarchy' of site arrangement modified from Haggett's (1965) scheme and which reflects community structure is presented in Figure 20. The scheme is essentially one in which decreasing hierarchy rank equates with increasing pattern entropy. The more structured community patterns are similar to those that Chang (1962) has designated the "Siberian" pattern, while the less structured correspond with his "Eskimo" pattern. It should be stressed that the above distinctions are most applicable to sites

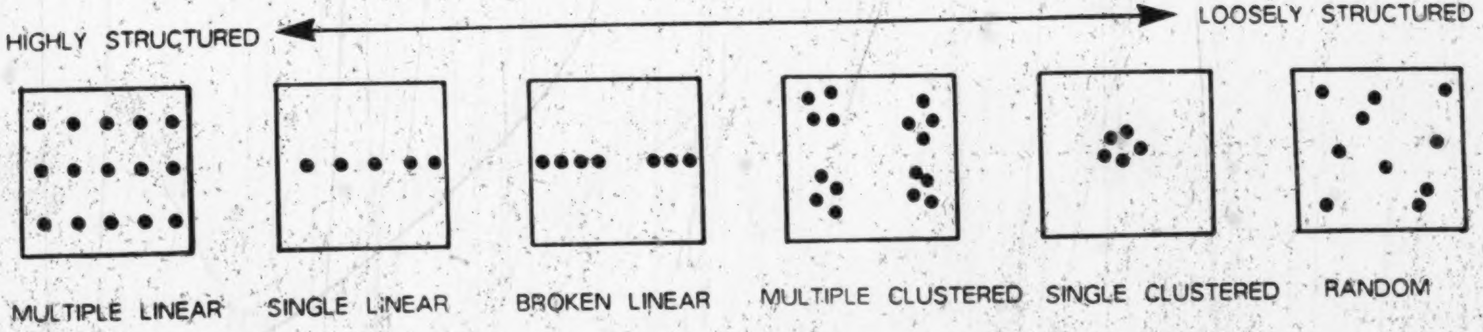

HIGHLY STRUCTURED
LOOSELY STRUCTURED
MULTIPLE LINEAR
SINGLE LINEAR
BROKEN LINEAR
MULTIPLE CLUSTERED
SINGLE CLUSTERED
RANDOM

Figure 20. Idealized hierarchy of site morphology.

representing maximum or near maximum aggregation. Furthermore, this represents an "ideal" scheme, and actual site patterns can be expected to only approximate the ideal patterns. An example of a site with moderately high internal structure is the historic Alaskan site at Utkeavik (Figure 21) while an example of a relatively "random" arrangement is the Hadza site of Ugulu (Figure 22).

5. Site Situation and Intersite Association

Site situation refers to the site location in relation to local faunal and raw material resources. Location is, of course, a relative term in that the economic range of a site will depend upon such factors as transportation methods, seasonal travelling conditions, nature of the terrain. As noted by Roper (1979), exploitative territories associated with a given residential site have traditionally been defined through two techniques; time "contours" of two hours walking distance, and fixed radii of ten km. Support for these assumptions has traditionally been drawn from Lee's (1969:61) observation that the !Kung normally remain within ten km of their camps to harvest resources, which, at a walking pace of ten-twelve minutes per km, translates into a two hour walk.

Amongst Inuit groups, Binford (1982:359) has noted a similar "foraging" distance for the Numamiut. Although a distance is not specified, Balkci (1970:73) characterizes the Historic Netsilik hunting area as "...not too far, usually within walking distance from camp" suggesting a similar radius and a similar pattern was observed among modern Netsilik during ethnoarchaeological studies in

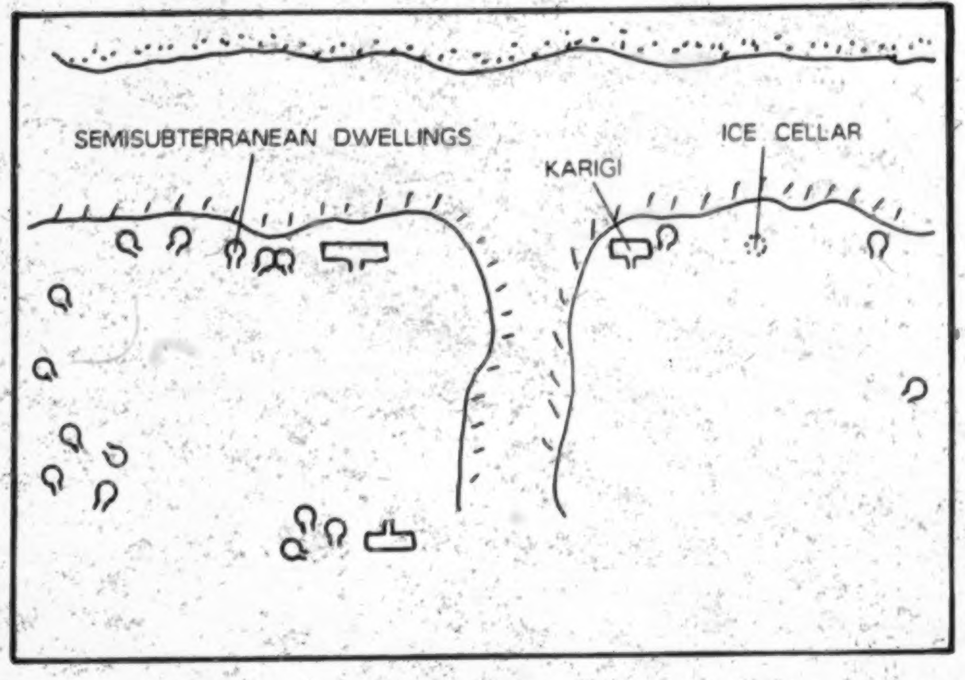

SEMISUBTERRANEAN DWELLINGS
KARIGI
ICE CELLAR

Figure 21. The Tareumiut site of Utkeavik, circa 1895, exhibiting characteristics of both multiple linear and multiple cluster internal arrangement. After Spencer 1959. Compare with Figure 22.

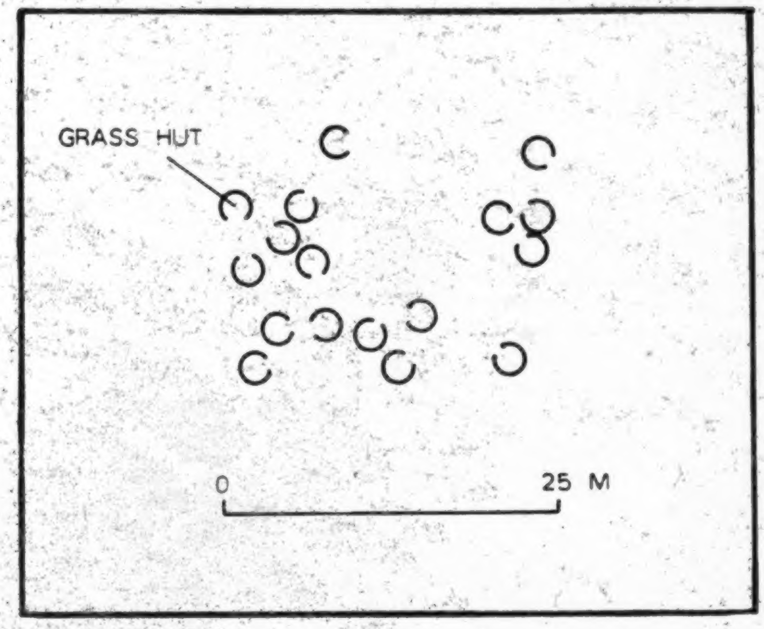


Figure 22. The Hadza site of Ugulu as recorded by Woodburn in October 1959, exhibiting characteristics of an internal site structure approaching random. After Woodburn 1972. Compare with Figure 21.

association with the present study (see Figure 23). Finally, Burch (1981:62) noted an eight km "catchment" or foraging zone for Alaskan Eskimos at Point Hope. Accordingly, the foraging radius can be considered as the accessible area within a ten km radius of a residential site, and the "target" resource(s) will be contained within that area. These "target" resources are identified according to modern resources or probable previous resources, within the foraging radius.

Traditionally, the logistical radius for Inuit groups varied considerably, and according to transportation techniques. However, one and one-half to two times the foraging radius (fifteen-twenty km) would appear to be a reasonable approximation (see e.g. Binford 1980:345, 1982: Fig. I; Burch 1981:62; and Figure 23 of this study). "Target" resources in the logistical zone will be primarily cached or living "bulk" resources, and critical raw materials.

6. Site Seasonality

Although a number of techniques have traditionally been employed in the determination of site seasonality (see e.g. Rathje and Schiffer 1982:270-271), those of particular relevance to the present study include feature type and faunal characteristics.

In the central and eastern Arctic, feature types show a particularly strong correlation with season of occupation. As discussed in detail previously, solidly constructed semisubterranean dwellings with cold-trap entrances are typically associated with winter-long occupations, snow dwellings with temporary winter

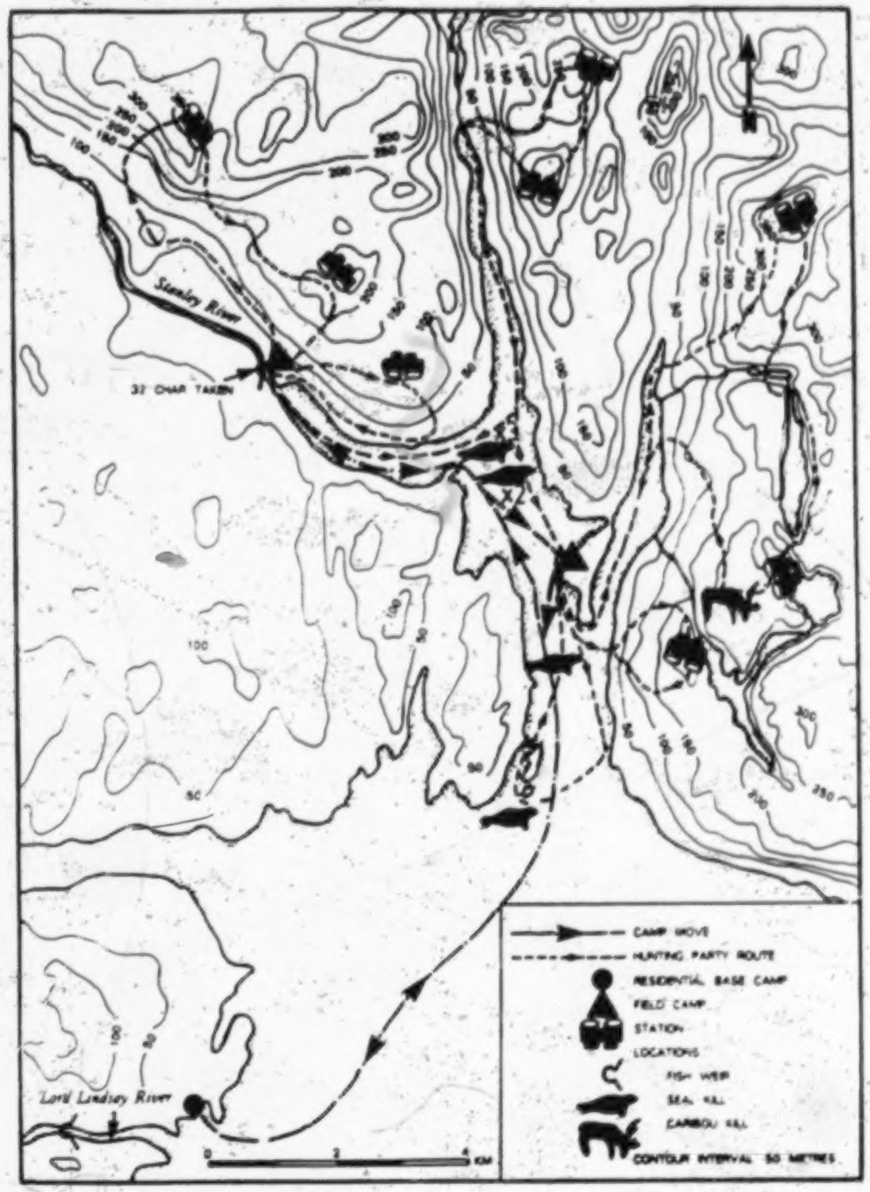

Stanley River
37 CHAR TAKEN
Lord Lindsay River
0
2
4 KM
CAMP MOVE
HUNTING PARTY ROUTE
RESIDENTIAL BASE CAMP
FIELD CAMP
STATION
LOCATIONS
FISH WEIR
SEAL KILL
CARIBOU KILL
CONTOUR INTERVAL 50 METRES

Figure 23. Settlement and hunting patterns of an Inuit group during a one week period in August 1981 in the Thom Bay region of Lord Mayor Bay.

occupations, sod qarmang with late fall occupations, snow and skin qarmang with fall and spring occupations, and tents with late spring through to early fall occupations. It should also be noted that Schledermann has suggested that, as opposed to the fall-only use of sod qarmang in the central Arctic, such structures were utilized throughout the winter in the eastern Canadian Arctic (1976a:44).

Seasonality estimates based on faunal characteristics have been reviewed by Monks (1981) and include methods such as the presence or absence of seasonally available fauna, physiological changes, and incremental structures. Such methods, however, actually indicate only the season of death of the particular resource examined. While a direct correlation between the season of death of a particular resource specimen and site occupation can be expected for logistically-related camps and temporary residential bases, such is not the case for more permanent residential bases, at which stored resources are consumed. In such instances, feature characteristics, combined with season of death estimates of the resources, should provide an estimation of the total length of site occupation based on the introduction of new resources to the site as they become available. Since, in the study area, more permanent residential sites are those associated with fall, winter, and spring occupations, determination of season of death of species available throughout these seasons will provide the most reliable indication of the season(s) of site occupation. Although there are a variety of such species, caribou (Peary caribou and isolated groups of barren ground caribou) and ringed seal constitute the most useful for the present study, and emphasis is accordingly placed on these species in the determination of season(s) of site occupation, utilizing incremental dental annuli (see e.g. McClaren 1958; Smith 1973; Miller 1974; Spiess 1976; Morrison 1983a, 1983b - see also Savelle and Will 1982; Savelle and Beattie 1983; and Gordon 1984 for a review and discussion of the various analytical techniques).

7. Diet Breadth

Although theoretically diet breadth refers to the absolute number and abundance of critical resources, some "co-harvesting" of minor resources (i.e. "unearned resources") can be expected. Furthermore, as outlined by Yesner (1981:150), optimal foraging theory predicts that large carnivorous foragers (e.g. humans) exploit critical resources in approximate proportion to their relative biomass. Accordingly, while specialists' (collectors) diet breadth may, in terms of absolute species abundance, approach that of generalists (foragers), it will nevertheless be narrower in terms of intentionally harvested resources (see Figure 24).

Determination of relative represented biomass for each species is directly dependent upon the relative proportion of individuals of that species. The various methods of quantification of faunal remains have been examined in considerable detail and include such methods as the determination of number of identified specimens per taxon (e.g. Casteel and Grayson 1977), minimum number of individuals per taxon (e.g. White 1953; Chaplin 1971), and the weighted abundance of elements (e.g. Holtzman 1979). As noted by Grayson (1979) and Lyman (1982), each is not without its problems, and each will be appropriate

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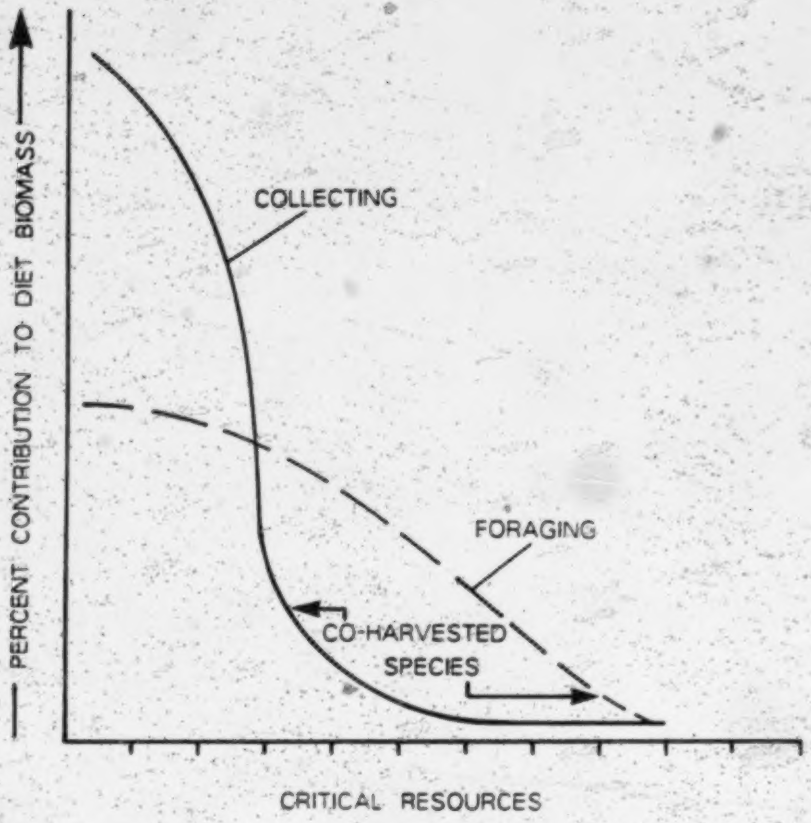


Figure 24. Comparison of biomass contribution of a given number of species to foraging and collecting strategy diets.

in different circumstances. However, for the purposes of the present study, the technique of determining the minimum number of individuals will be utilized since it a) allows for intersite comparisons of relative species abundances (and therefore approximate diet contribution), and b) allows for the effect of culling of larger species and differential taphonomic processes.

8. Culling

Determination of the degree of culling, that is, the conscious separation of most and least useful parts of a carcass (cf. Binford 1978a:459), is in turn dependent upon the determination of the "utility" of individual anatomical units. While appropriate "actualistic" studies in this regard have been conducted by Binford (1978a) for caribou and sheep, "follow-up" studies have been essentially restricted to Binford's (1981b) own research and that of Speth (1983) on bison and Will (1985) on musk-oxen. From ethnographic accounts of historic Inuit groups (e.g. Jenness 1922; Rasmussen 1931; Spencer 1959; Boas 1964; Balikci 1970), however, and from "actualistic" studies associated with the present project, it would appear that most smaller seals and smaller land mammals are not characteristically culled, while larger sea mammals and terrestrial mammals are (see for example Plates 1a and 3a).

The question of bowhead whale culling is a particularly important issue since the traditional view of Thule Eskimo culture as a predominantly active whaling culture (where resources permitted) has recently been severely questioned by Freeman (1979). According to

Freeman, archaeologists have not distinguished between whale hunting and whale bone utilization; that is, the presence of bowhead whale bones at Thule sites may simply derive from the scavenging of the skeletons of previously beached bowhead whales. Accordingly, "culled" elements present at Thule dwelling sites should be correspondingly underrepresented at "beached whale" locations, while elements present at the latter sites should be underrepresented at dwelling sites. If however, the whales were actually hunted and butchered, then initial processing can be expected to have been either at the ice edge or in relatively deep water from umiaks (Spencer 1959; Taylor 1979), and as such "low utility" elements would not survive as "beach" assemblages (see McCartney 1980 and McCartney and Savelle 1983 for a detailed discussion of the archaeological implications for active whale hunting).

In terms of "preferred" elements, if meat, blubber, and entrails only were required, little if any whale bone would be returned to dwelling sites from the primary processing locations (see e.g. Kristof 1973:353; and Plate 3a). High utility "structural" whale bone, however, would include primarily mandibles and skulls with attached maxillae, and secondarily ribs, scapulae, and vertebrae (McCartney 1979b).

9. Site Age

Estimates of the age of Thule and Historic Inuit sites and/or components have traditionally been based on elevation above sea level (e.g. Mathiassen 1927a:197), dendrochronology (e.g. Giddings 1952;

Manning 1956), the presence of European materials (e.g. Mathiassen 1927a:198), and more recently radiocarbon dating and cross-dating of artifacts and features (see Dekin 1973, 1978 and Savelle 1980 for a summary of the development of Thule chronology). Elevation above sea level, while certainly a useful tool in the chronological assessment of many paleoeskimo sequences (see for example Meldgaard 1960, 1962) is of extremely limited use in the study area where isostatic rebound has been on the order of 3-5.5 m during the past 1000 years (Dyke 1983, 1984). Dendrochronological methods are likewise of extremely limited utility, and applicable only in the western Arctic. The remaining three methods are dependent upon excavations and surface collections, and while certainly extremely useful in traditional, extensive excavations of Thule semisubterranean dwellings, they are not always appropriate for smaller, temporary sites wherein artifacts may be rare and/or lack diagnostic traits, or material suitable for radiocarbon dating is lacking.

One of the more apparently obvious alternative methods, but certainly one which has received very little attention, is that of post-occupational vegetational development. Although vegetation dating methods, especially those employing lichens, have been used to a considerable extent to date natural features (see e.g. Beschel 1961; Brown _et al._ 1976; Seaward 1977; and the bibliography in Andrews and Andrews 1979), they have rarely been utilized in archaeological studies (and in such cases have been generally restricted to British dry-stone monoliths - see e.g. Brightman and Seaward 1977:266-277). N. McCartney (1978, 1979) however, has recently noted extensive changes in vegetational communities, including lichens, at Thule winter sites consisting of semisubterranean dwellings on Somerset Island and on the northwest coast of Hudson Bay, and noted the potential for the dating of features such as tent rings.

Accordingly, it was determined to record lichen characteristics of above ground stone features, together with stone feature material, during the present study. Subsequently, if a number of the features could be dated either absolutely or relatively through independent methods, then the determination of the approximate age of features within any given Thule or Historic site should be possible.

CHAPTER FIVE:

FIELD METHODS AND SCHEDULE

The present study requires the acquisition of data at two levels: the region and the site.

Regional Level. At the regional level, the focus of study is on the relationships between sites. As discussed by Read (1975:51), regional sampling designs presuppose two basic decision levels. The first requires the designation of the type and size of sample units, and the second the sample procedure.

a) Type and Size of Sample Units. Read (*op. cit.*) identifies three possible types of sample units: point, line, and quadrat. Theoretically, quadrats (of whatever geometic shape), since they define areas, give the most reliable overall areal coverage. However, for Inuit groups throughout the central Arctic, coastlines and major river/valley systems have historically been the locus of the vast majority of travel routes and camping locations. Furthermore, coastlines especially constitute the line of interface between the marine and terrestrial (and in many instances riverine) environmental regimes, and in many instances will represent the most efficient location from which to exploit the respective resources. Accordingly, linear survey units which follow coastlines and/or river/valley systems will most closely approximate actual land use in terms of site location. This is not to suggest that inland sites are not expected; however, they will be relatively rare relative to coastal and river/valley sites, and in addition can be expected to be primarily stations and locations which, as suggested previously, will in most instances be characterized by extremely low archaeolgoical visibility. Given finite time and logistical resources, a concentrated effort to locate such sites systematically would be impractical. An indication of the scarcity of such sites can be obtained by comparing the coastal and river/valley site density with inland site density in the Creswell Bay, Brentford Bay, and Netsilik Lake regions as determined during the 1977 Polar Gas survey in the study region (Schledermann 1978:116, 128, 145, 181, 195). Furthermore, during extensive geological reconnaissance in the inland regions of several portions of Somerset Island, including Creswell Bay in 1971-1975 (see e.g. Savelle 1978, 1979), no archaeological sites were noted.

Ideally, survey line distance should be such that the coastal and river/valley segments sampled allow for the recognition of at least one complete potential collecting radius, i.e. fifteen-twenty km. Under certain conditions, a fifteen-twenty km line distance will not be possible: however if line segments in such cases include probable foraging and/or collecting terminii such as a specific recognized location, comparison of the two strategies will still be possible.

b) Sampling Procedure. Areas selected for survey lines within the two major study regions should ideally encompass major potential whaling grounds or major caribou crossing localities, and major areas of secondary resource concentrations. It should be stressed that secondary resources can also include raw materials, either naturally occurring (e.g. wood, steatite), or introduced (e.g. abandoned explorers' ships and caches - see Hickey 1979, 1984, and Savelle 1985 for detailed discussions).

Given the above considerations and requirements, surveys in the study region were designed such that extended line survey segments incorporated both primary and secondary resource localities. If the resources did not coincide within a common survey line segment, then additional line segments were incorporated in the research design to ensure locations of both resource categories were examined.

Locations of the selected survey areas are indicated in Figure 25, and include Creswell Bay and Aston Bay in the northern "whale" area, and King William Island and adjacent Sherman Inlet and O'Reilly Island, and the Lord Mayor Bay-Netsilik Lake district in the southern "caribou" area. Details of the individual surveys, which were conducted in 1980, 1981, and 1982, and locations and/or other data pertaining to the various contained resources are represented in Figures 26-31. With the exception of O'Reilly Island and the Victoria Harbour area of Lord Mayor Bay, all line survey segments were initially planned to be at least 20 km in length. It should be stressed that for all the survey regions except the Lord Mayor Bay area, survey routes are primarily along generally wide coastal raised beach zones offering continuous potential camping sites and extremely high archaeological site visibility (see for example Figure 11a). Physiography and topography could potentially skew site patterns in the Lord Mayor Bay survey area, as the area consists of generally rugged Precambrian uplands. However, there are sufficient coves and low headlands along the entire survey route such that while local site placement patterns would be affected, regional patterns should not be

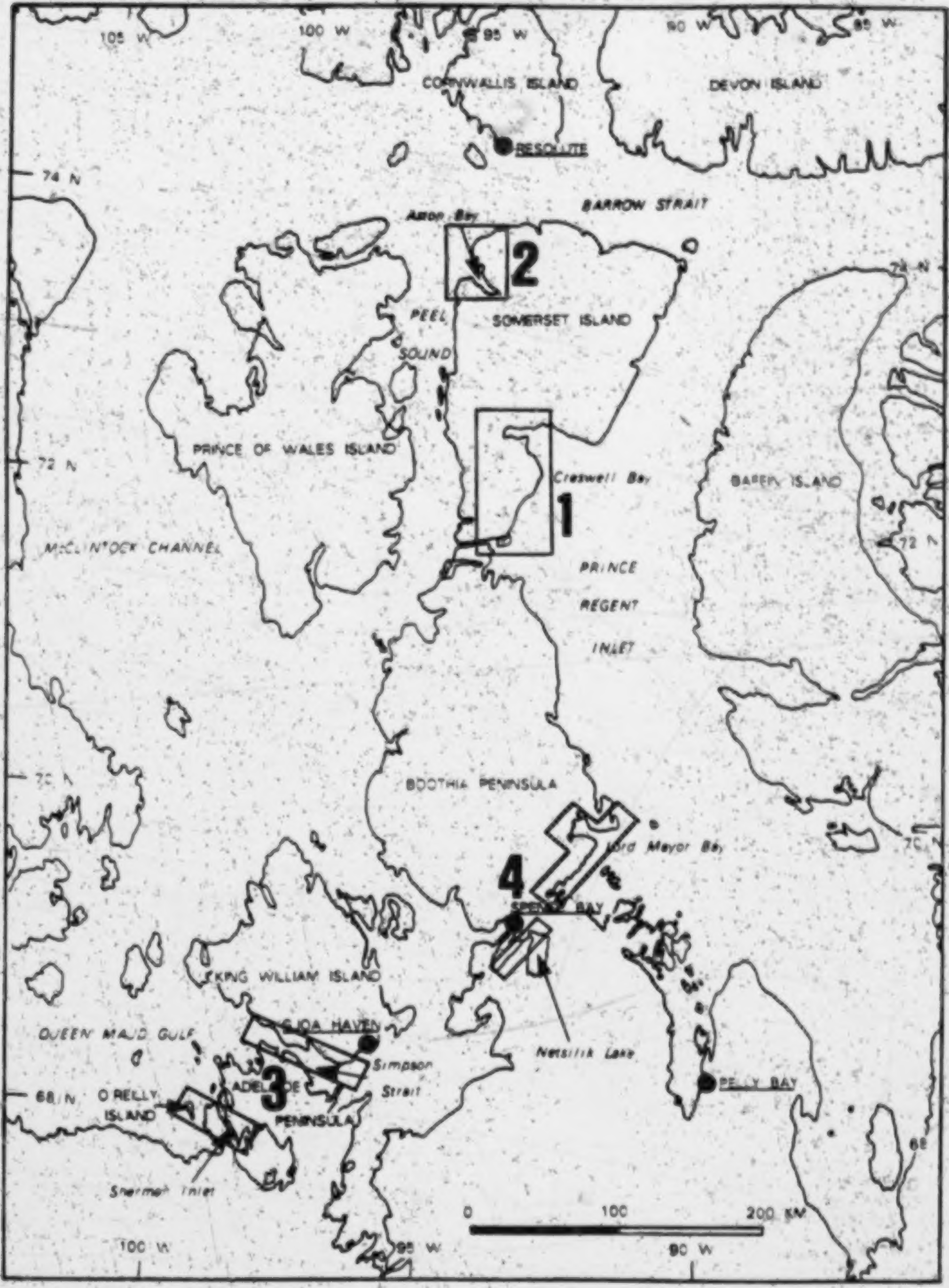

105 W
100 W
95 W
90 W
85 W
CORNWALLIS ISLAND
DEVON ISLAND
RESOLUTE
74 N
BARROW STRAIT
Aston Bay
2
PEEL SOUND
SOMERSET ISLAND
74 N
PRINCE OF WALES ISLAND
72 N
Creswell Bay
1
BAFFIN ISLAND
72 N
M'CLINTOCK CHANNEL
PRINCE REGENT INLET
BOOTHIA PENINSULA
70 N
Lord Mayor Bay
70 N
4
SPENCE BAY
KING WILLIAM ISLAND
GJOA HAVEN
QUEEN MAUD GULF
Simpson Strait
Netsilik Lake
PELLY BAY
68 N
O'RELLY ISLAND
ADELAIDE PENINSULA
3
Sherman Inlet
68
0
100
200 KM
100 W
95 W
90 W

Figure 25. Survey regions: (1) Creswell Bay and (2) Aston Bay in the northern whale area, and (3) King William Island-Adelaide Peninsula and (4) Lord Mayor Bay-Netsilik Lake in the southern caribou area.

Figure 26. Survey routes and major resources in the Creswell Bay area.

Legend:

— — —Foot Survey —·· —··Helicopter Survey

Major Resources:

a - Anadramous Fish

bw - Bowhead Whales

sw - Small Whales

s - Seals

c - Caribou

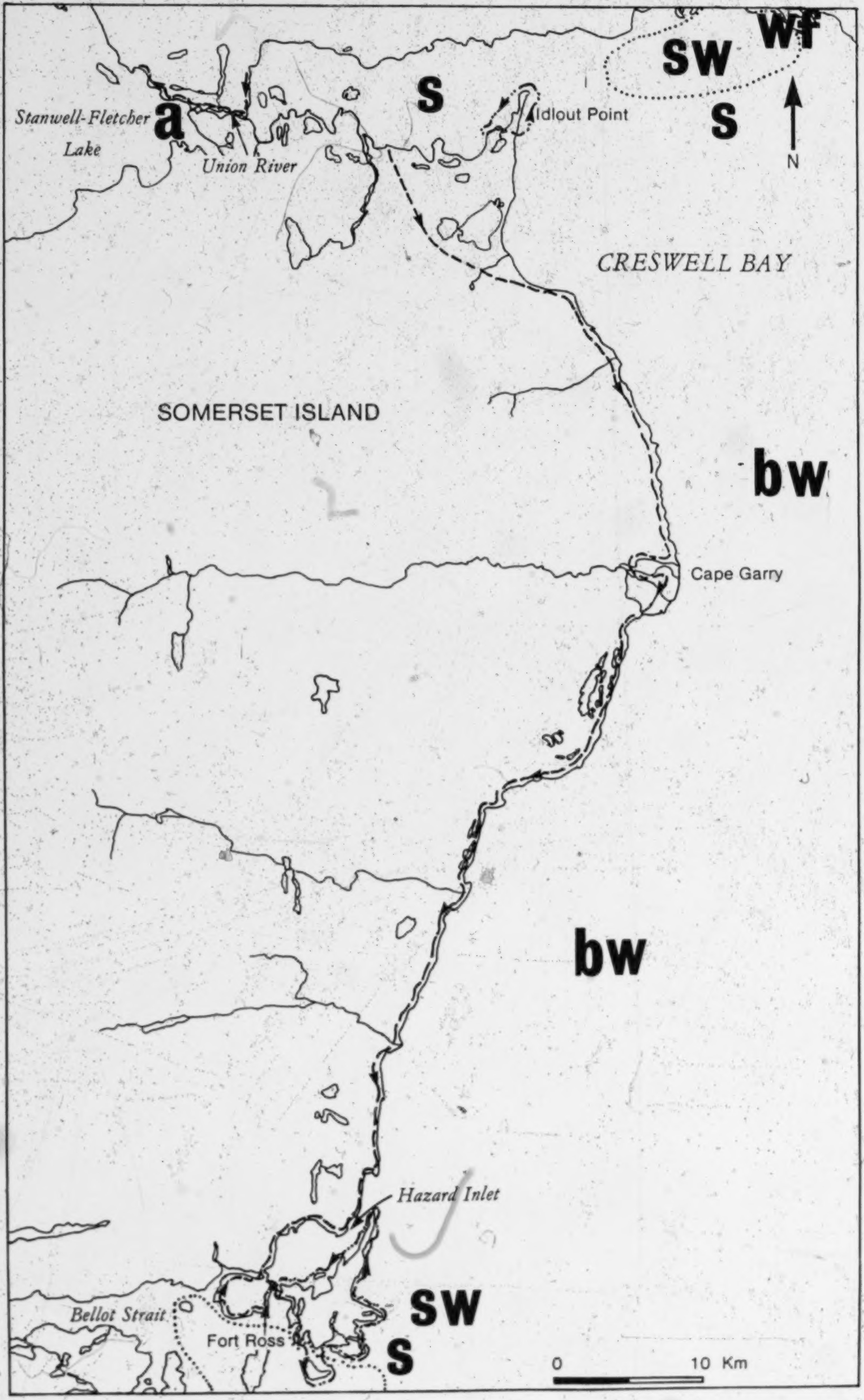
← - Caribou Migration Route

m - Musk-Oxen

wf - Waterfowl

ex - Abandoned Explorers' Materials

dw - Driftwood


Stanwell-Fletcher Lake
a
Union River
s
Idlout Point
sw
wf
s
N
CRESWELL BAY
SOMERSET ISLAND
bw
Cape Garry
bw
Hazard Inlet
sw
Bellot Strait
Fort Ross
s
0
10 Km

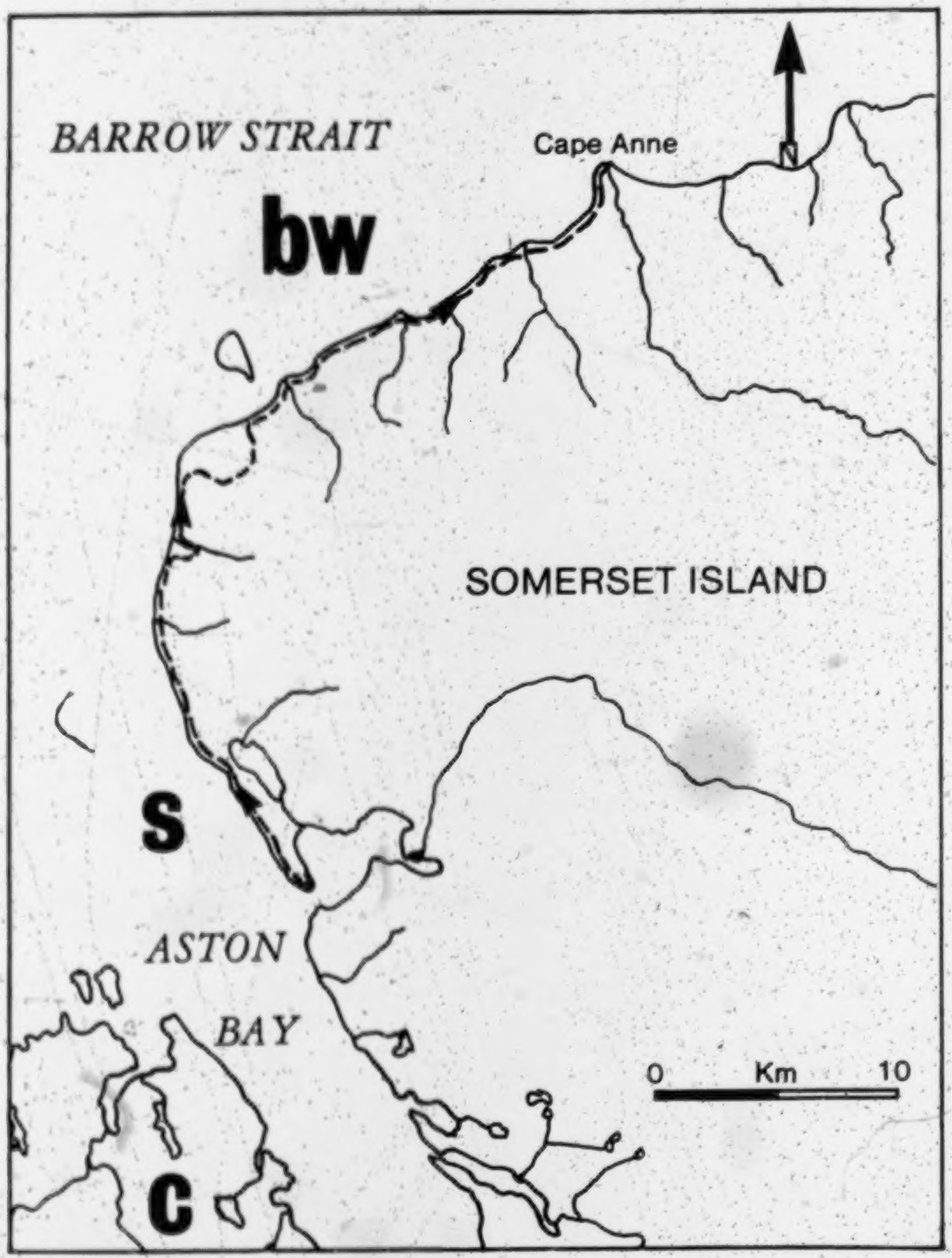

BARROW STRAIT
Cape Anne
bw
SOMERSET ISLAND
s
ASTON
BAY
c
0 Km 10

Figure 27. Survey routes and major resources in the Aston Bay area. Legend as for Figure 26.

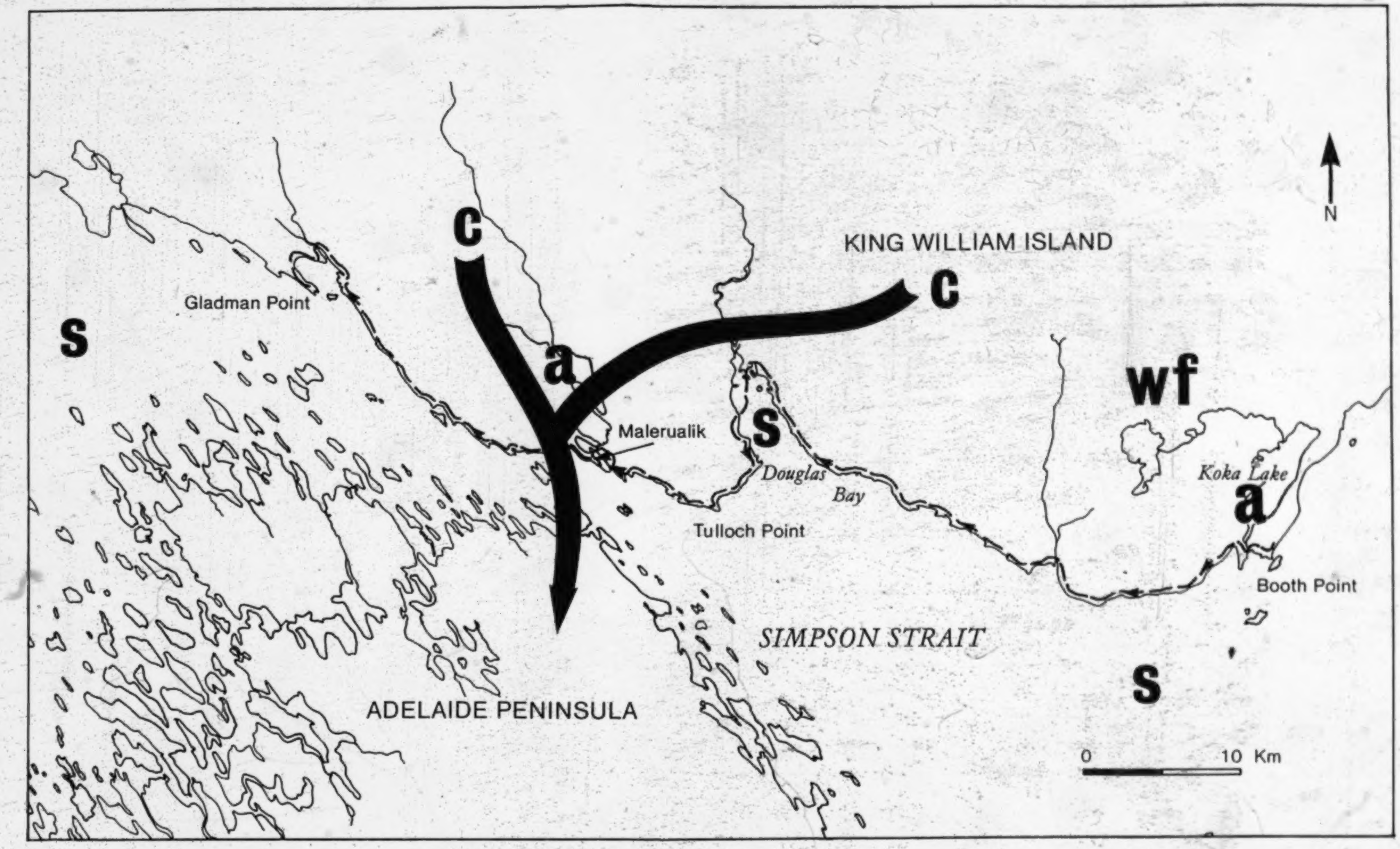

KING WILLIAM ISLAND
c
c
a
s
Gladman Point
Malerualik
s
Douglas Bay
Tulloch Point
wf
Koka Lake
a
Booth Point
SIMPSON STRAIT
s
ADELAIDE PENINSULA
0
10 Km
N

Figure 28. Survey routes and major resources in the King William Island area. Legend as for Figure 26.

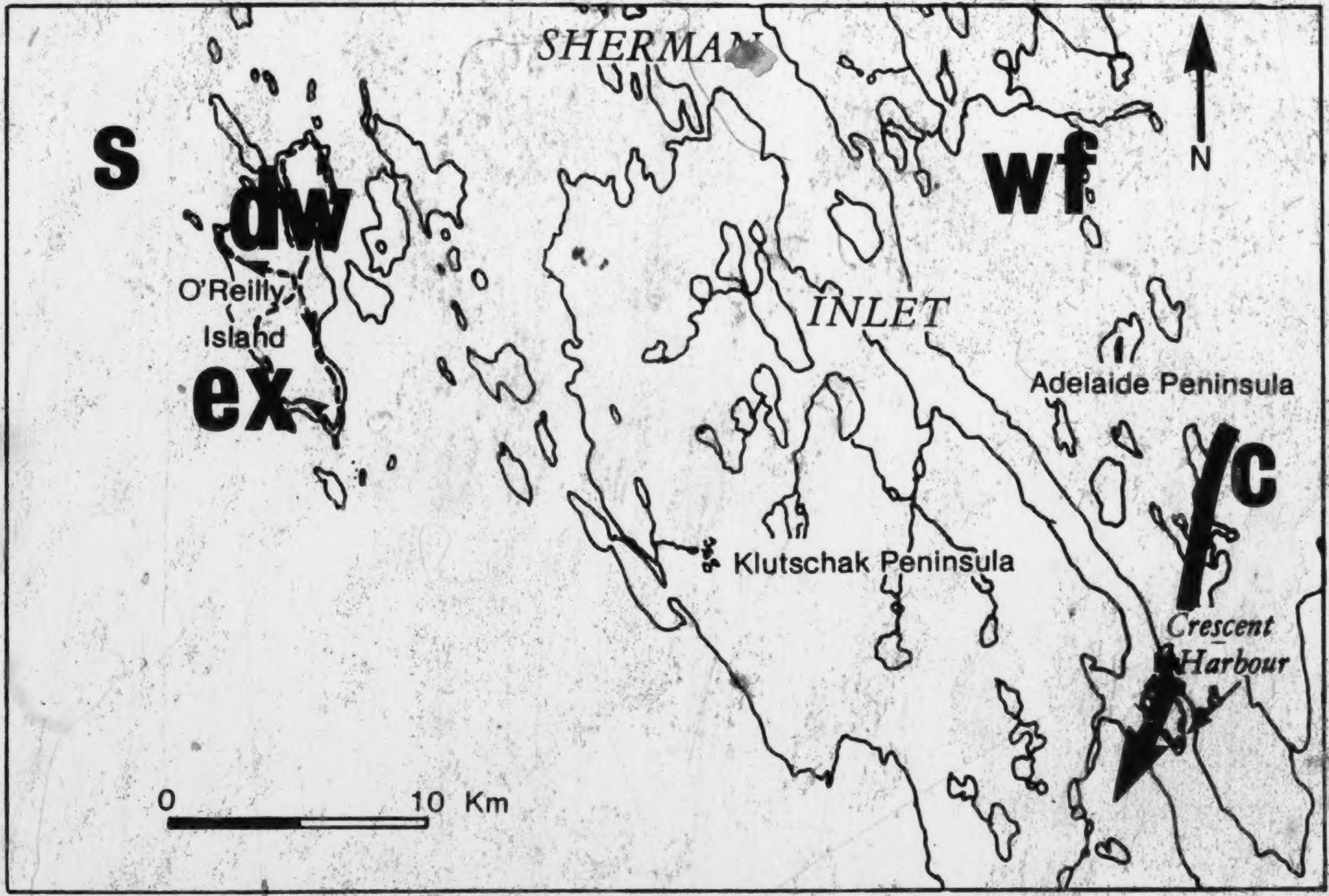
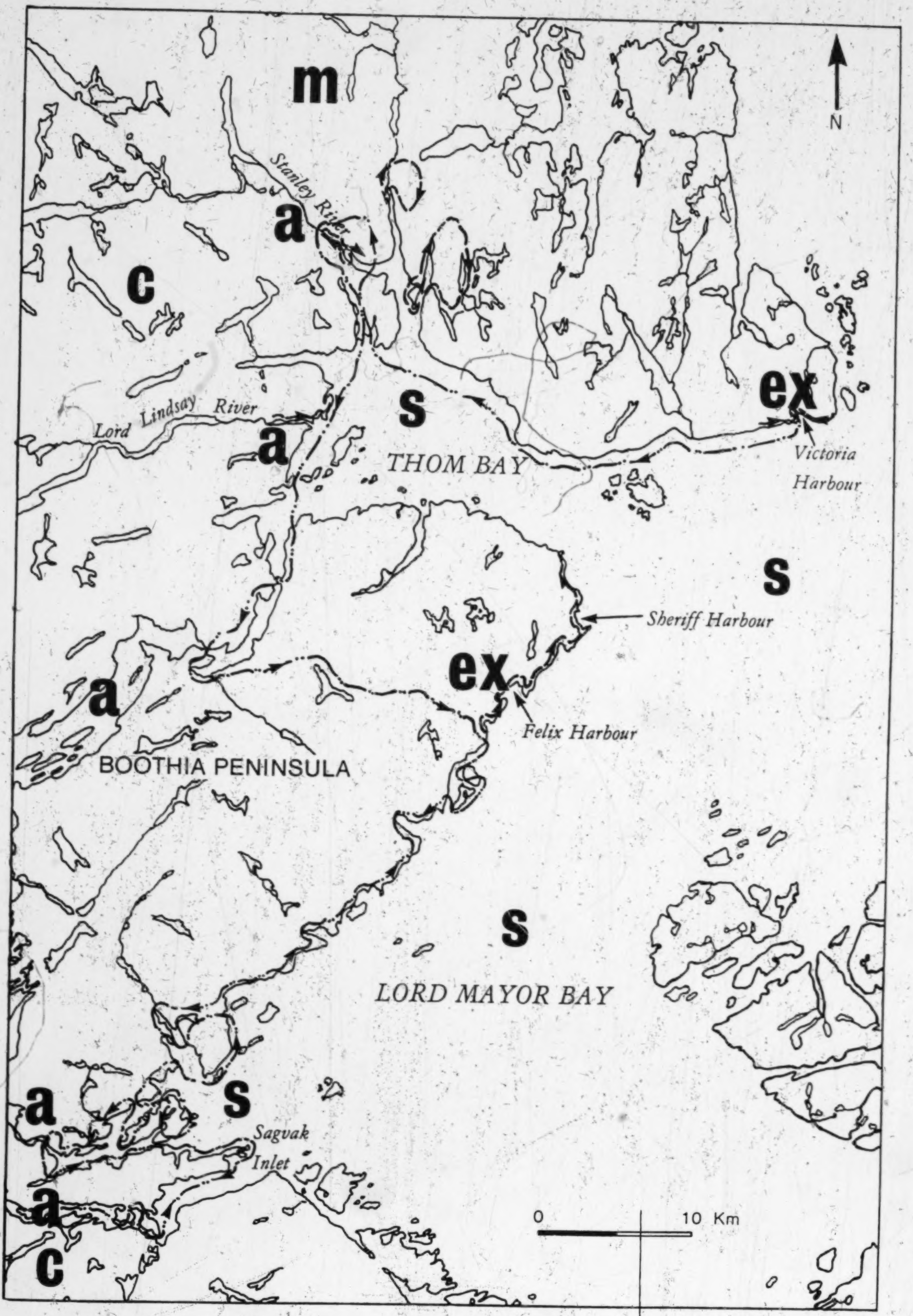

SHERMAN
INLET
s
dw
O'Reilly Island
ex
wf
N
Adelaide Peninsula
c
Klutschak Peninsula
Crescent Harbour
0
10 Km

Figure 29. Survey routes and major resources in the Adelaide Peninsula area (Sherman Inlet and O'Reilly Island). Legend as for Figure 26.



N
m
Stanley River
a
c
Lord Lindsay River
s
a
THOM BAY
ex
Victoria Harbour
s
Sheriff Harbour
ex
a
Felix Harbour
BOOTHIA PENINSULA
s
LORD MAYOR BAY
a
s
Sagvak Inlet
a
c
0
10 Km

Figure 30. Survey routes and major resources in the Lord Mayor Bay area. Legend as for Figure 26.

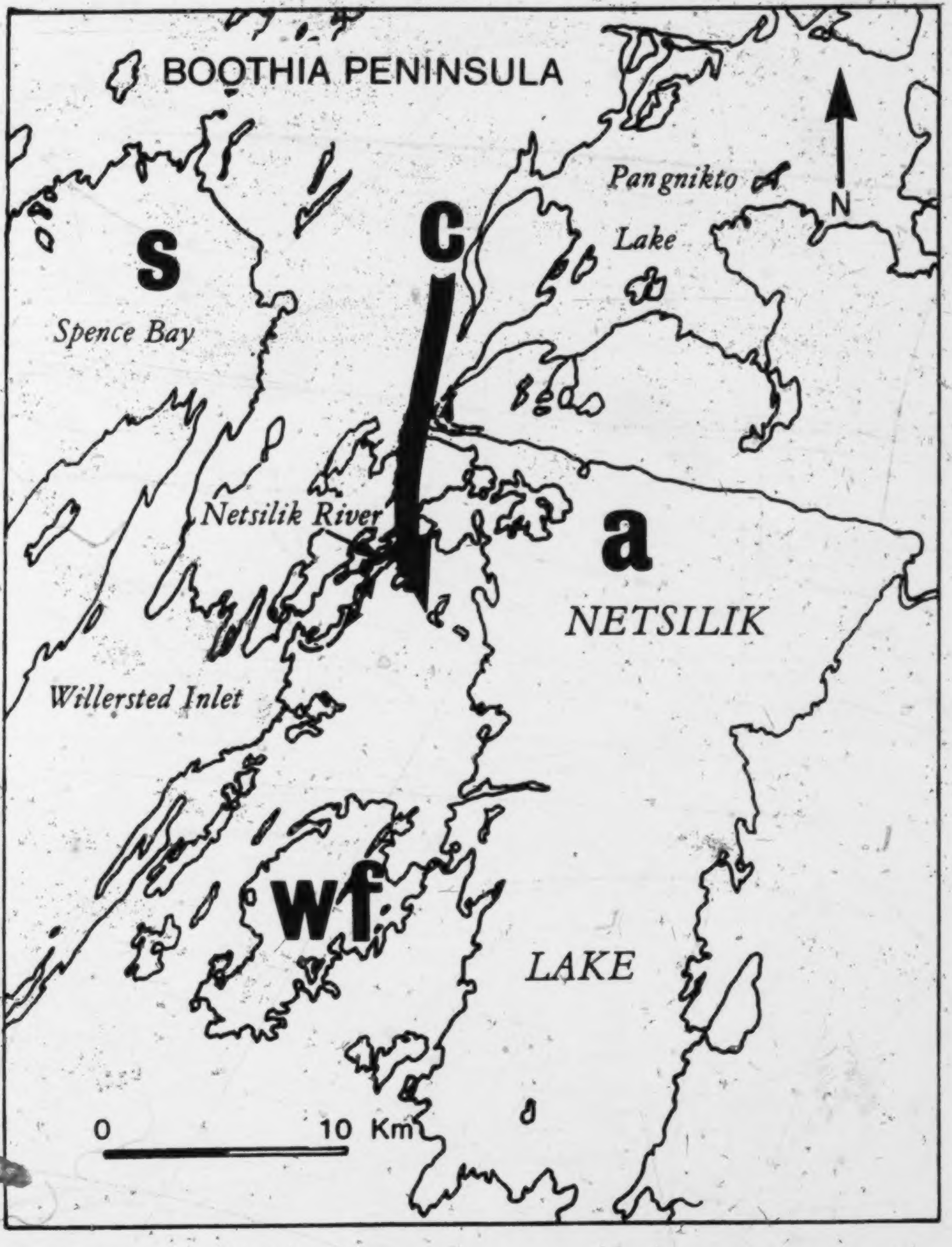

BOOTHIA PENINSULA
N
Pangnikto Lake
s
c
Spence Bay
Netsilik River
a
NETSILIK
Willersted Inlet
wf
LAKE
0
10 Km

Figure 31. Survey routes and major resources in the Netsilik Lake area. Legend as for Figure 26.

other than that strictly continuous series of sites will not occur. Inland sites, even those within several hundred metres of the coast, would be difficult to locate in this area. However, based on an admittedly restricted inland helicopter survey in the region (see Figure 30), such sites are probably rare. Survey lines less than 20 km (the northern part of Thom Bay, Union River, and Sherman Inlet) resulted from difficulties related to field logistics. In addition to the surveys described above, during the same period additional surveys were conducted on Cornwallis Island, Devon Island, northern Prince of Wales Island, northern and eastern Stefansson Island, and the Starvation Cove and Montreal Island regions of Adelaide Peninsula and at Fury Beach on Somerset Island. These latter investigations were specifically designed to locate 19th century Inuit and European explorers' sites, and have been discussed in detail elsewhere (Savelle 1981; Beattie and Savelle 1983; Savelle 1985; Hickey *et al.* n.d.). Finally, during the course of the field investigations, several ethnoarchaeological studies were undertaken in conjunction with the archaeological studies (see e.g. Savelle 1984), and the relevant results are incorporated when appropriate (see e.g. Plates 1, 3, 4, 5 and 12, and Figures 18, 23, 32, and 33).

Site Level. Because of the high archaeological visibility of most Thule and later Inuit archaeological features, sampling at the site level for feature types can be considered to provide essentially a 100% sample of the target population (c.f. Chenhall 1975:5) once the site is recognized. In addition, in many instances the feature type and style, associated surface materials, and the nature of the lichen cover provide information on age, and cultural affiliation. Furthermore, surface bone counts can provide generally accurate and comparable data (McCartney 1979), especially in the case of bowhead whales.

Most traditional Thule site investigations typically include the excavation of most dwellings (or as many at any one site as is possible within a given time period). For the present study, however, excavations are required primarily to determine the nature of the associated smaller (i.e. smaller than bowhead whale) faunal remains, and secondarily, artifacts and/or radiocarbon dates for determination of cultural affiliation. Historically, there is little reason to suggest probable significant differences in contemporary subsistence practices between members of any given residential group. In this regard, Staab has studied in detail the faunal remains from seven contemporary Thule dwellings at Silumiut and associated middens and observed that "...the types of animals, skeletal elements, and general distribution remained essentially the same" between dwellings (1979:353). Similarly, Stenton noted that "Striking similarities exist in the composition of house assemblages" of faunal remains between six Thule dwellings and associated middens he excavated at the Peale Point Thule site (1983:135). Finally, Rick, in discussing the sampling technique for faunal remains from two Thule sites on Somerset Island noted that McCartney (the excavator) considered that the remains from one dwelling at each site were "...representative of their respective sites..." (1980:99).

Accordingly, the complete excavation of a dwelling and associated midden should, at least for comparative purposes, provide a close approximation of the remains at contemporary dwellings. Furthermore, the analysis by Staab (1979) and ethnoarchaeological studies undertaken in connection with the present study suggest that, for the determination of culling strategies, faunal remains from both external midden areas and internal dwelling areas should be recovered and combined for comparison (see e.g. Figures 32 and 33).

Given the characteristics of Thule and Historic Inuit archaeological sites in the study area, the extensive nature of the surveys, and the concomitant logistical and time constraints, site examination was conducted on three levels. At the most detailed level, individual sites were mapped and clearing excavations and/or testing of selected features was conducted. At the next level, sites were mapped and surface materials noted, and occasionally collected. At the least detailed level, sites were noted as to feature type and numbers, and cultural affiliation estimated from feature characteristics, surface materials, and/or the nature of the associated vegetation.

While, as noted, surface artifacts were occasionally collected, most artifact collections were restricted to mapped and excavated sites. Large faunal elements such as whale bones and most other elements noted during foot surveys were identified in the field. Excavated faunal material from a recent site at the Union River in Creswell Bay (see Savelle 1984) and from the Malerualik Thule site (site 81-61) on King William Island was identified in the laboratory, while that from other sites was identified in the field. Sided caribou and seal mandibles representing the maximum MNI from all sites were retained for dental annuli analysis, and for all Thule sites with

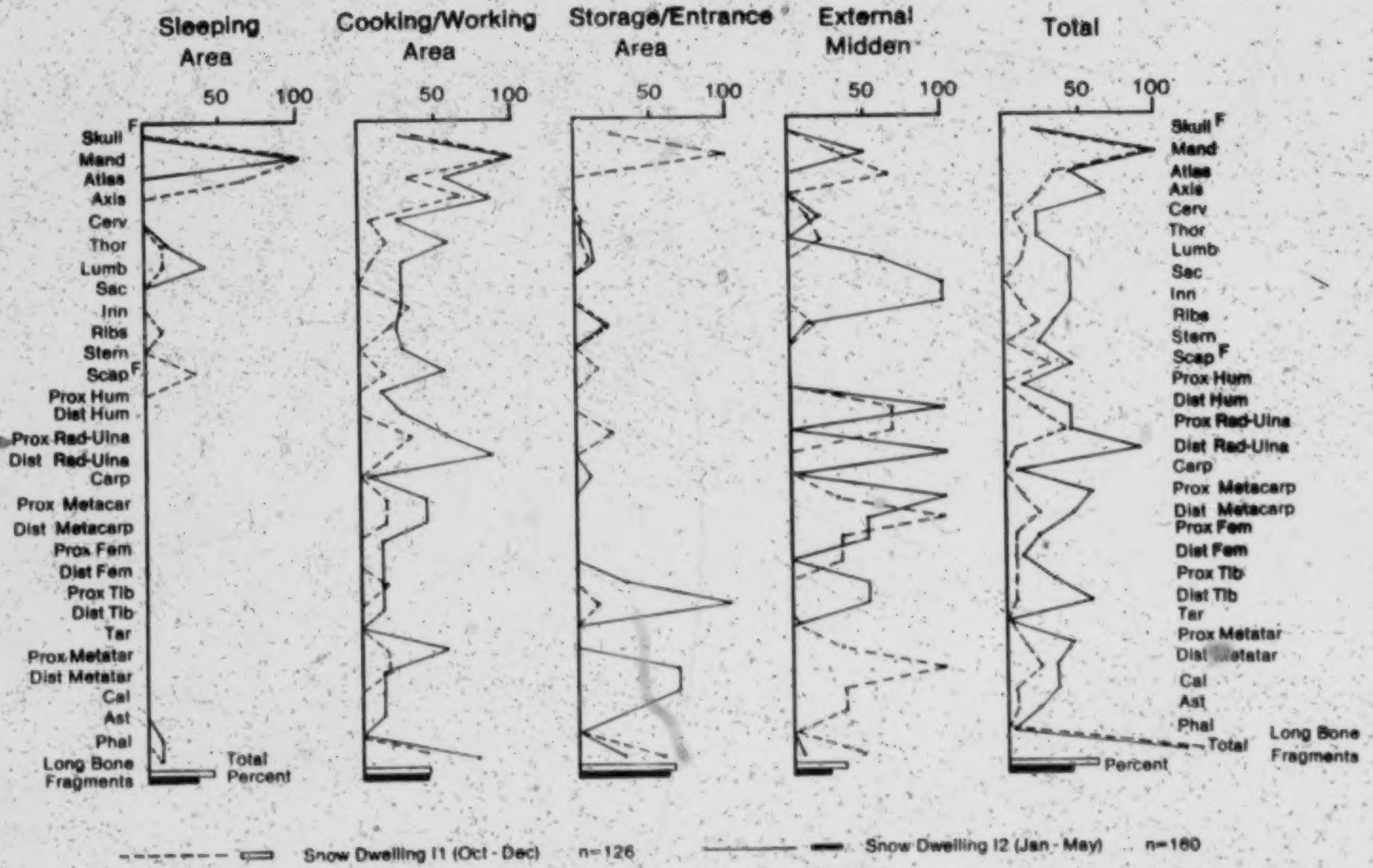


Figure 32. Distribution of caribou elements (as percent MNI per area) according to activity area for two historic snow dwelling features excavated at the Union River, Creswell Bay. From Savelle 1984.

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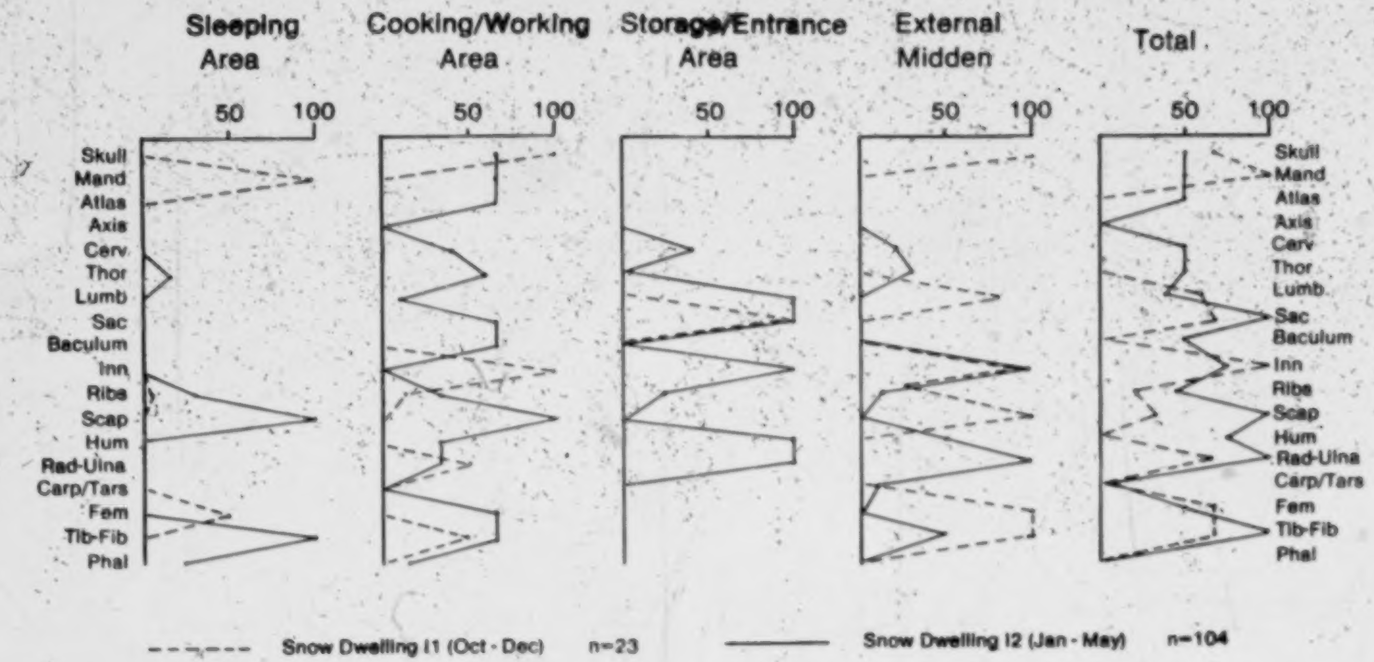


Figure 33. Distribution of seal elements (as percent MNI per area) according to activity area for two historic snow dwelling features excavated at the Union River, Creswell Bay. From Savelle 1984. Copyright Society for American Archaeology 1984.

semisubterranean dwellings which were excavated and/or tested, sufficient faunal material for radiocarbon dates was retained.

CHAPTER SIX:

ASSIGNMENT OF AGE AND CULTURAL AFFILIATION

As discussed previously, site and feature age can best be established by radiocarbon and cross-dating of artifacts and/or features, the presence of European materials, and, although previously untested, lichen community characteristics.

Feature type: The term "Classic Thule" as introduced by McCartney (1977:21) refers to the period of maximum bowhead whale distribution and abundance in the eastern and central Arctic regions, during which relatively massive sod, stone, and locally wood or whalebone, semisubterranean dwellings with cold trap entrances were utilized as the major winter residential shelter. Schledermann (1975, 1976a) and Sabo (1981) have demonstrated a shift from these more massive structures to the shallower, qarmang structures lacking true cold-trap entrances and solid roofs during the Classic-Modified Thule transition on Baffin Island, and McGhee (1972) has suggested a similar transition in the Amundsen Gulf region. Although McCartney did not excavate any qarmang-like structures, he did allude to their probable, short-term, utilization in the northwest Hudson Bay region prior to the extensive use of snow dwellings (1977:29). Assuming that the same massive semisubterranean dwelling-qarmang transition took place in the study area, and assuming that extensive qarmang utilization was also a relatively short-term phenomenon in this area, then a further distinction within the Thule period can be suggested: early Classic Thule - that period during which massive semisubterranean dwellings with true cold-trap entrances were in use, and late Classic Thule - that period during which less massive, qarmang-like structures lacking true cold-trap entrances were in use. For the study area, radiocarbon dates for early Classic Thule and late Classic Thule features according to the above distinction are given in Table 4. The comparisons suggest that the assumption that the direction of change of dwelling styles, and the approximate time period during which the transition took place, are consistent with the transition elsewhere. The only notable anomaly is the date of 940±50 A.D. for a qarmang feature at site 82-17 on the Netsilik River. This date is too early for the late Classic period, and since none of the artifacts excavated from this site in 1982 in connection with the present study or in 1977 during the Polar Gas Archaeology Project (Schledermann 1978:316) suggest such an affiliation, it is accordingly rejected. Although the date of 1375±75 A.D. from the late Classic Thule site at Cape Walker is generally consistent, it may nevertheless be too early, since the remains of at least 20 seals, one walrus, and one polar bear were found in association (Ramsden 1981:18), and fat contamination cannot be ruled out (see e.g. McGhee and Tuck 1976; Arundale 1981). Relative to the Creswell Bay dates, a later date for Cape Walker can be expected. The only other radiocarbon date obtained from the study area is one of 1750 ± 105 (NMC 1245) on caribou bone from Cache 2 at site 81-61 on King William Island. However, since this cache also contained Classic Thule artifacts in direct association, it is accordingly rejected. The early Classic-late Classic distinction in semisubterranean dwelling types is supported by the contained artifacts (see below).

Table 4. Radiocarbon Dates for Early and Late Classic Thule Semisubterranean Dwellings

1. Northern "Whaling" Area

Site	Cultural Affiliation	Lab. No./ NMC Sample No.	Date A.D.	Material	Reference
Learmouth (Creswell Bay)	Early Classic	S-1320	880 ± 65	Wood	Wilmeth 1977 (cited in Savelle 1980)
	"	S-1321	1425 ± 80	Wood	"
	"	S-1322	1040 ± 60	Wood	"
	"	UGA-1619	1365 ± 85	Wood	McCartney 1979
Cape Garry (Creswell Bay)	"	S-1323	945 ± 100	Wood	Wilmeth 1977 (cited in Savelle 1980)
	"	S-1324	1120 ± 70	Wood	"
	"	S-1325	825 ± 90	Wood	"
	"	UGA-1619	910 ± 65	Wood	McCartney 1979
Cape Walker (Northern Peel Sound)	Late Classic	I-11,769	1375 ± 75*	Fox	Ramsden 1981

Table 4. Continued.

2. Southern Caribou Area

Site	Cultural Affiliation	Lab. No./ NMC Sample No.	Date A.D.	Material	Reference
Sherman Inlet (82-11)	Early Classic	NMC 1311	945 ± 50	Caribou	This study
Lord Mayor Bay (81-80)	Early Classic	NMC 1249	690 ± 160 (975 A.D.)*	Seal	This study
King William Island (81-61)	Late Classic	NMC 1244	1460 ± 105	Caribou	This study
King William Island (81-61)	Early Classic	NMC 1245	1750 ± 105	Caribou	This study
King William Island (81-73)	Late Classic	NMC 1246	1650 ± 60	Musk-ox	This study
King William Island (81-52)	Late Classic	NMC 1247	1470 ± 60	Caribou	This study
Netsilik River (82-17)	Late Classic	NMC 1312	940 ± 50	Caribou	This study

* Corrected for fractionation and marine reservoir effect according to Arundale 1981.

It should be stressed here that the classification of semisubterranean dwellings is necessarily subjective, and that for the most part field designations of 'heavy' vs. 'light' were made without the benefit of excavations. Although most identifications are thus tentative, complete or nearly complete excavations of four semisubterranean dwellings, testing of an additional eleven, and examination of approximately fifteen previously excavated dwellings in the study area by Rasmussen (1931) and McCartney (1979a), suggest that surface appearances are reasonably reliable indicators.

Other feature types do not allow such relatively fine temporal distinctions, since while respective frequencies of the various types may change through time (e.g. tent ring style), without further detailed studies they cannot be presumed to be individually temporally sensitive.

Artifact type: The analysis of formal and stylistic attributes of artifacts has traditionally figured prominently in Neoeskimo archaeological research, primarily in response to the necessary cultural-historical chronology building over such a vast area. Although large numbers of lithic and well-preserved organic artifacts are traditionally excavated from Neoeskimo sites (see especially Mathiassen 1927a,b; Holtved 1944), essentially all attempts at cultural placement of various sites and/or components have relied heavily on the comparison of attributes of harpoon heads. Mason (1902) and Wissler (1918) were amongst the first to examine harpoon head relationships, based on the few collections available to them, but Mathiassen was the first to examine them with the benefit of provinience data, noting that "...they are better than any other element of Eskimo culture for showing cultural connection and chronology in the Eskimo culture" (1927b:11). Later, Collins noted that harpoon heads "...form the most dependable single criterion of cultural change at our disposal." (1940.550), while Ford remarked that "It is well recognized that in the study of Eskimo prehistory harpoon heads serve much the same function as 'key fossils' as do ceramics for cultures in a Neolithic state of development" (1959:93). An extreme, but nevertheless consistent, viewpoint was expressed by Yamaura, who suggested that

> "...harpoon heads are...basic cultural traits, and their study to explain origins and type development represents the study of cultures themselves. In other words, the harpoon head types are considered to be symbolic of total cultures" (1979:476).

Although other artifact classes such as arrowheads (Stanford 1976) and pottery (Arnold and Stemmle 1983) have occasionally been noted as potential temporal markers, they have traditionally received very little emphasis. Consequently, most eastern Arctic Thule studies have tended to concentrate to varying degrees on harpoon head typologies (e.g. McGhee 1972, 1984; Schledermann 1975; McCartney 1977; Jordan 1979; Taylor and McGhee 1979, 1981; Morrison 1983a,b).

Accordingly, the generally established harpoon head temporal sequence as established in those, and other, works is followed in the present study. For example, Sicco, Sicco-like and other early Thule III forms ("wedged" and/or sharp-angled), Thule II with a single pair of barbs and lacking end-blade slots, lashing slots, sideblade slots, vestigial spurs, sharp-angled spurs, and stepped external ridges are all considered forms and/or attributes primarily associated with the early Classic Thule period, while later Thule III forms ("smooth"), Thule II variants, Thule V, drilled lashing holes, and smooth-angled spurs, are forms and/or attributes primarily associated with late Classic and Modified Thule periods (see e.g. Stanford 1976 and Savelle 1980 for a detailed review). Otherwise, McGhee's cautionary note to the effect that

> "...the prudent archaeologist is probably wise to forego any attempt at making an objective judgement, and to instead report an overtly subjective opinion on the stylistic relationships between the assemblages with which he is dealing" (1984:87-88)

would appear to be applicable to the study area. The recovered artifacts will not be treated in detail in the present work, but will be presented in a subsequent report.

Before discussing other dating techniques, however, it should be noted that the early Classic-late Classic distinction noted for dwelling features correlates well with artifact attributes. For example, Thule II harpoon heads with lashing slots, simple barb systems, angular spurs and stepped external ridges, and "early" Thule III form with side blade slots (Mathiassen 1927:312), and an "early" pottery form (Mathiassen 1927a:318) all occur in association with early Classic sites, while "later" Thule III forms, with smooth-angled spurs and lashing holes (although not restricted to late Classic, they are the only lashing type occurring during this period) are associated with late Classic sites. Furthermore, Mathiassen noted that the site of Kangerarfigssuaq on King William Island (site 81-54 in this study), which contains late Classic generally "lightly" constructed semisubterranean dwellings, was "for both geological and archaeological reasons...later than [the early Classic component] at Malerualik [site 81-61 in tnis study]." (1927a:322 - see also

Mathiassen's Figure 109, p.323).

European material: Three basically different categories of archaeologically recognizable European material were introduced into the study area during the historic period; a) trade goods such as beads and needles which were introduced during the early historic period directly by various exploring parties (e.g. Ross 1835: ; McClintock 1859:209; Amundsen 1908:120), b) exotic "raw" material such as iron, copper, tin, hardwoods, etc., introduced through the abandonment of ships and caches associated with the Ross expedition of 1829-33 (Ross 1835) and the Franklin expedition of 1845-48 (Cyriax 1939), and finally c) following the establishment of the various trading posts in the area beginning in 1923, imported finished tools, glass bottles, canvas tents, tobacco tins, Primus and other stove types, aluminium (primarily from aircraft wrecks), and most importantly, rifles and ammunition (see e.g. Balikci 1964).

Unless there were indications otherwise, sites and/or components containing only items of the first two categories were assumed to relate to the early Historic period, while sites and/or components containing (but not restricted to) items of the third category are assumed to relate to the late Historic period. "Recent" period sites (post government-housing era) and/or components containing such items as diapers, various plastics (sunglasses, records), magazines, and/or other apparently modern material from local stores or mail-order firms were identified but are not included in the present study.

While unmodified or slightly modified items of European/Euroamerican manufacture are generally readily placed within the early or late Historic period, heavily modified material from the abandoned expedition ships and caches was identified through such methods as metal thickness (and compared with unmodified metal items in various museums and from undisturbed or minimally disturbed explorers' caches), recognizable manufacture characteristics such as square or rectangular cross-sections of copper and iron nails (e.g. Hume 1970; Nelson 1968), earthenware (e.g. Huges, in Nicks 1969:158), lid plugs and soldered seams on tinned and other containers (Busch 1981; Drummond and Lewis 1937), and comparison with "unique" items such as the engine and engine mounts of Ross' Victory, parts of which were abandoned at Felix and Victoria Harbours in Lord Mayor Bay.

Lichen characteristics: The dating of features using lichen characteristics is based on the assumption that the disturbance of stones results in the exposure to potential lichen colonization of parts of the stone previously imbedded in beach sands or gravels, vegetation patches, or otherwise not exposed in a position favourable for lichen colonization until the time of feature construction. Accordingly, if the lichen characteristics on a series of features of known absolute and/or relative age can be determined, then a calibration curve can be constructed such that the age of otherwise undated features can be estimated.

In constructing the various calibration curves, three variables must be considered in addition to feature age: lichen type, host material, and macro- and microenvironment.

1. Lichen types: A large number of lichen species occur in the Arctic regions, with Thomson (cited in N. McCartney 1978) estimating a total of 2000. Of interest in the present study, however, are those individual types or communities that occur consistently in a given

environment and on a given substrate. Several lichen studies have demonstrated such constant associations, with Hansen (1978a, 1978b) for example, noting fourteen major environment/substrate-dependent communities in southern Greenland, and Richardson and Finegan (1977) noting several distinct communities associated with differing beach and inland outcrop environments on Devon Island. In the study area, three distinct lichen groups (tentatively identified on the basis of comparison with those illustrated in McGrath 1977) were noted associated with archaeological features; a) those composed predominantly of bright red or orange _Xanthoria_ sp., b) those composed predominantly of the mineral grey _Physcia_ sp., the dark grey-black _Umbilicaria_ sp. and the black _Parmelia_ sp., and c) those composed predominantly of _Xanthoria_ sp. and _Umbilicaria_ sp.. Many other lichen types were noted on archaeological features (e.g. _Haematomma_ sp., _Pertusaria_ sp.), but in varying, and lesser, concentrations.

2. Host material: Lichen host material, that is, the composition of the structural material, falls into two major material types; rock and whalebone. With few exceptions, structural whalebone served as host to a varying but predominantly _Xanthoria_ sp. community. Lichen communities on rock, on the other hand, varied considerably and according to rock type.

Two major geological bedrock suites occur in the study area; a) dolomite, limestone, and locally sandstone, associated with Arctic Platform sedimentary rocks, and b) gneiss, granite, and locally diabase and/or gabbro associated with the Precambrian Shield and Boothia Arch (Blackadar and Christie 1963; Thorsteinsson and Tozer 1970). The former sedimentary rock suites occur primarily on northern and eastern Somerset Island, the coastal flanks of Boothia Peninsula, and King William Island, while the latter metamorphic and igneous rock suites occur primarily on central Boothia Peninsula and western Somerset Island. Extensive till sheets blanket much of the low-lying coastal areas underlain by sedimentary rocks, resulting in the introduction of significant quantities of granite and gneiss boulders within these areas (see e.g. Dyke 1983, 1984).

Xanthoria sp. communities are generally restricted to dolomite and limestone structural components, while primarily Physcia-Umbilicaria-Parmelia communities, and secondarily Xanthoria-Umbilicaria communities, are generally restricted to granite, gniess, and/or diabase/gabbro structural components. These differing community-host material associations are consistent with similar associations found on "dolomitic" vs. "granite/sandstone" substrates on Devon Island (Richardson and Finegan 1977), and on "calcareous" vs. "granitic" substrates in southern Greenland (Hansen 1978a, 1978b).

3. Macro- and microenvironments: Differences in lichen community composition as a function of physiographic and climatic variables have been noted by Hansen (1978a, 1978b), Lindsay (1977), and Hale (1954), among others. In the study region, two major climatically-influenced vegetation zones occur; polar desert in the northern "whale" area and polar semidesert in the southern "caribou" area (Bliss 1977:3). Since surveys in these areas were conducted along exposed coastlines and, in the Netsilik Lake area, exposed river/lake coastlines, comparison within each zone according to lichen community and substrate material should be valid.

At the microenvironmental level, the most important factor, assuming otherwise generally constant conditions, is the degree of exposure of the feature to wind scour (see e.g. Lindsay 1977). Accordingly, generally protected areas of individual features (e.g. the lower parts of the inner stones of tent rings, protected areas of caches, etc.) provide the most stable colonizing platforms.

Methods: In view of the above considerations, for each feature or series of features encountered during the surveys, predominant lichen types colonizing protected areas that, on the basis of field inspection, appeared to have been initially exposed (or initially protected in the case of intensively scoured stones) at the time of construction were noted, the degree of cover of the lichen community estimated (the surface lichen cover expressed as a percent), and the rock type identified.

Calibration curves for each of the two major regions according to rock type and lichen community are represented in Figures 34 and 35. If the features that were apparently used as bird roosts, characterized by significant quantities of nutrients and accompanied by relatively luxurious lichen growth, are omitted, the expected overall increase in lichen cover with increasing age is apparent. In the northern area, the curve is useful for a Thule vs. early or late Historic distinction only, since the primary host material, limestone and dolomite, is characterized by relatively low colonization levels, and there is a lack of firmly dated Modified Thule features, due to the apparent abandonment of the area during the Modified Thule period. In the southern area, the relatively large number of dated sites, the favourable colonization materials and climate, and the apparent continuous occupation from the initial Thule expansion into the area up to the Historic period, enables a more precise age estimation (that is, Classic Thule-Modified Thule/early Historic-late Historic).

It should be stressed that degree of lichen cover in each case is necessarily estimated, and the technique as employed is therefore subjective. Nevertheless, at the "coarse-grained" levels employed, differentiation into two major temporal groups, each spanning approximately 400-500 years, is possible.

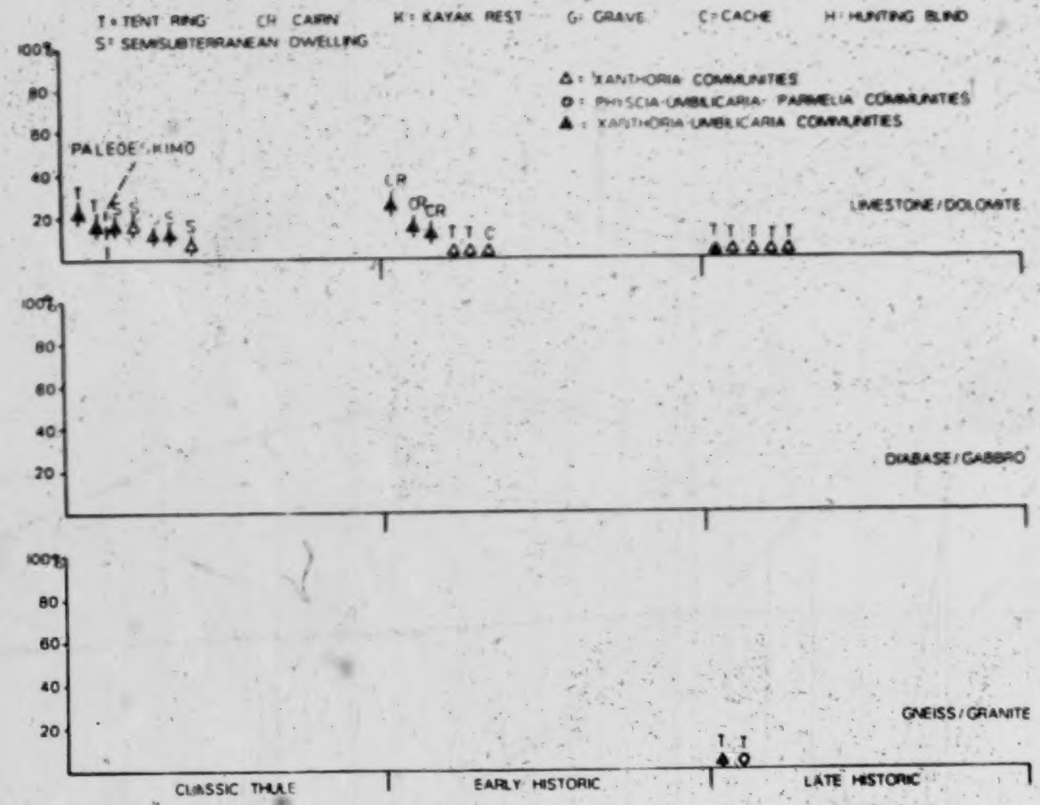


Figure 34. Degree of lichen cover on various substrate types in features of known or estimated age in the Creswell Bay, Aston Bay, and neighbouring areas in the northern part of the study area.

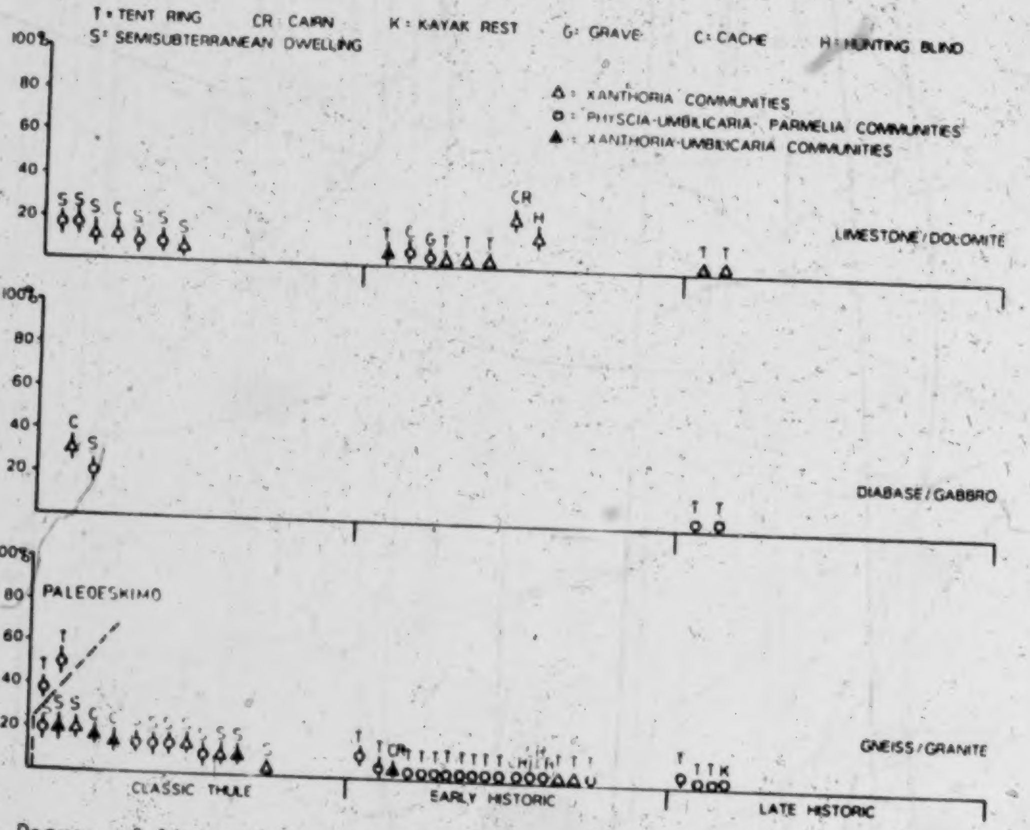


Figure 35. Degree of lichen cover on various substrate types in features of known or estimated age in the King William Island-Adelaide Peninsula and Lord Mayor Bay-Netsilik Lake areas in the southern part of the study area.

CHAPTER SEVEN:

SURVEY RESULTS AND SITE SUMMARIES

The results will be discussed in detail in Chapters 8 and 9 according to the previously established hypotheses and test implications, and as such will not be summarized in the traditional site report format. Site locations are represented in Figures 36-41, and site summaries in Tables 5-10.

As discussed previously, field camps are designated according to the number of tent rings (i.e. one or two) while spring-fall residential camps contain three or more tent rings. Several of the larger residential sites also contained large tent ring structures interpreted as the summer equivalent of karigi (Plate 6b). Winter and/or late fall residential sites consisted of both 'heavy' and 'light' semisubterranean dwellings (Plate 7a,b), snow dwelling scatters (Plate 8a), and probable karigi (Plates 8b, 9a).

Recognized caches were of three of the five ethnographically-recorded types. These include above ground boulder caches, excavated gravel caches (Plate 11a), and small, deep semisubterranean structures lacking platforms or other features and which are interpreted as ice cellars.

Recognized locations include both "high-bulk" and "low-bulk" locations. High-bulk locations were of two types: bowhead whale beaching and processing localities, identified by the presence of single or multiple bowhead whale crania and/or significant amounts of other apparently culled elements (see Plate 10a); and major caribou drive systems (Plate 10b). Low-bulk locations include small hunting blinds, driftwood procurement localities, metal procurement localities (Plate 11b), stone foxtraps, and raw lithic material procurement localities.

Individual site and/or component characteristics according to cultural affiliation for the various survey regions are represented in Figures 42-55. Component in this instance refers to all those features considered to relate to early Classic Thule, late Classic Thule, Modified Thule, early Historic, or late Historic periods at any one site. Sites 81-107 and 81-108 listed in Table 8, for example, both have Classic Thule and late Historic components, each of which are listed separately. Although a substantial number of late Historic sites and/or components relating to the recorded 20th Century Inuit occupation were recorded in the Creswell Bay area, and two apparently early Historic sites were recorded in the Aston Bay area, they are not included in the present study. The former are excluded because there is no apparent preceding Modified Thule-early Historic occupation, and thus no basis to assess direction of change of the parameters under consideration. The latter, on the other hand, are excluded since they apparently represent brief forays by small field and/or residential groups out of Netsilik and/or Iglulik Inuit historically-documented 'core' areas (see Savelle 1981).

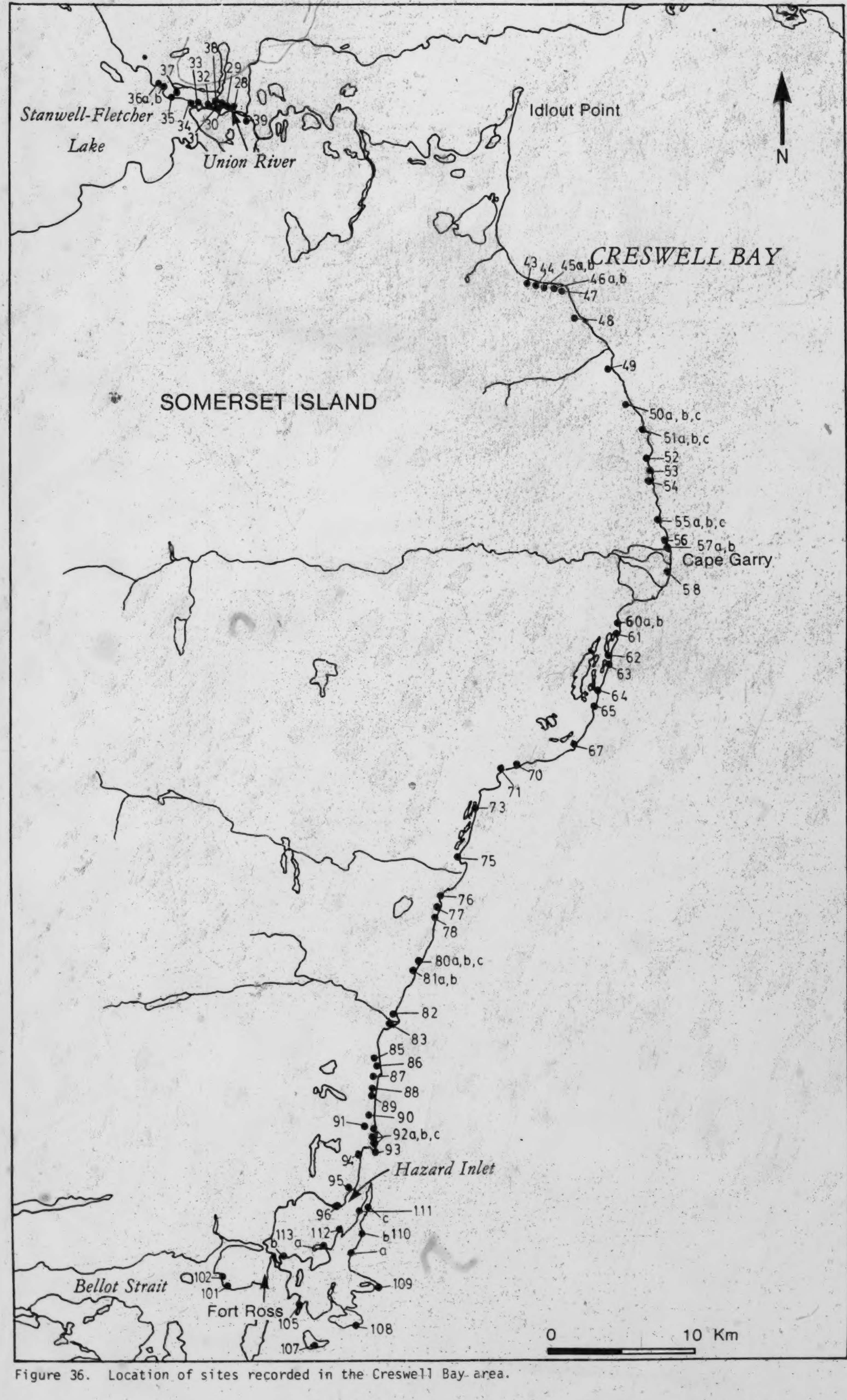

Stanwell-Fletcher
Lake
Union River
36a,b
37
35
34
33
32
31
30
38
29
28
39
Idlout Point
N
CRESWELL BAY
SOMERSET ISLAND
43
44
45a,b
46a,b
47
48
49
50a, b, c
51a, b, c
52
53
54
55a, b, c
56
57a, b
Cape Garry
58
60a, b
61
62
63
64
65
67
70
71
73
75
76
77
78
80a, b, c
81a, b
82
83
85
86
87
88
89
90
91
92a, b, c
93
94
95
Hazard Inlet
96
111
c
110
b
a
112
a
113
b
109
102
101
Bellot Strait
Fort Ross
105
108
107
0
10 Km

Figure 36. Location of sites recorded in the Creswell Bay area.

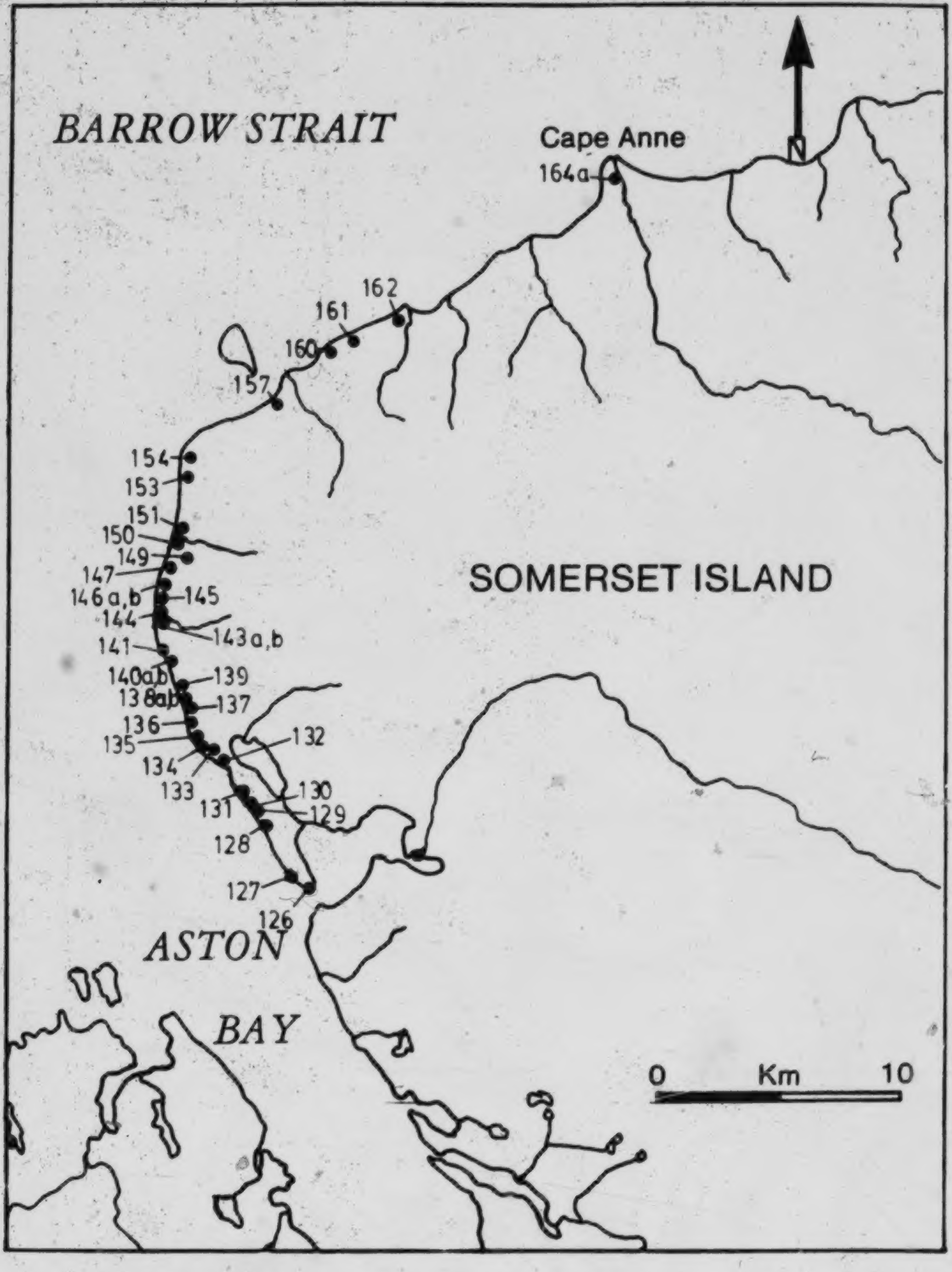

BARROW STRAIT
Cape Anne
164a
162
161
160
157
154
153
151
150
149
147
146a,b
145
144
143a,b
141
140a,b
139
138a,b
137
136
135
134
133
132
131
130
129
128
127
126
SOMERSET ISLAND
ASTON
BAY
0
Km
10
N

Figure 37. Location of sites recorded in the Aston Bay area.

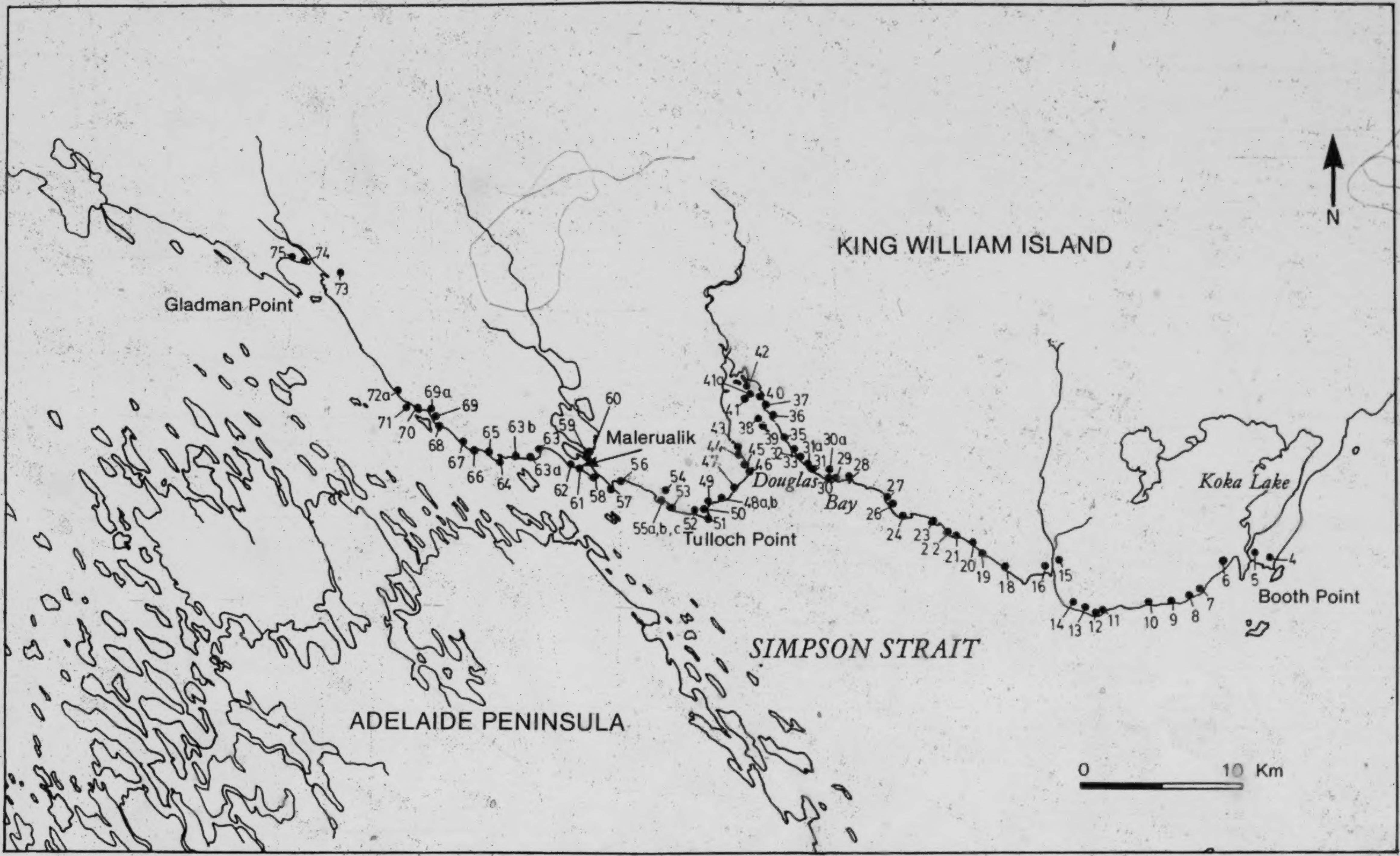

KING WILLIAM ISLAND
N
Gladman Point
75
74
73
72a
71
70
69a
69
68
67
66
65
64
63b
63
63a
62
61
60
59
Malerualik
58
57
56
55a,b,c
54
53
52
51
50
49
48a,b
47
46
45
44
43
42
41a
41
40
39
38
37
36
35
33
32
31a
31
30a
30
29
28
Douglas
Bay
Tulloch Point
27
26
24
23
22
21
20
19
18
16
15
14
13
12
11
10
9
8
7
6
5
4
Koka Lake
Booth Point
SIMPSON STRAIT
ADELAIDE PENINSULA
0
10 Km

Figure 38. Location of sites recorded in the King William Island area.

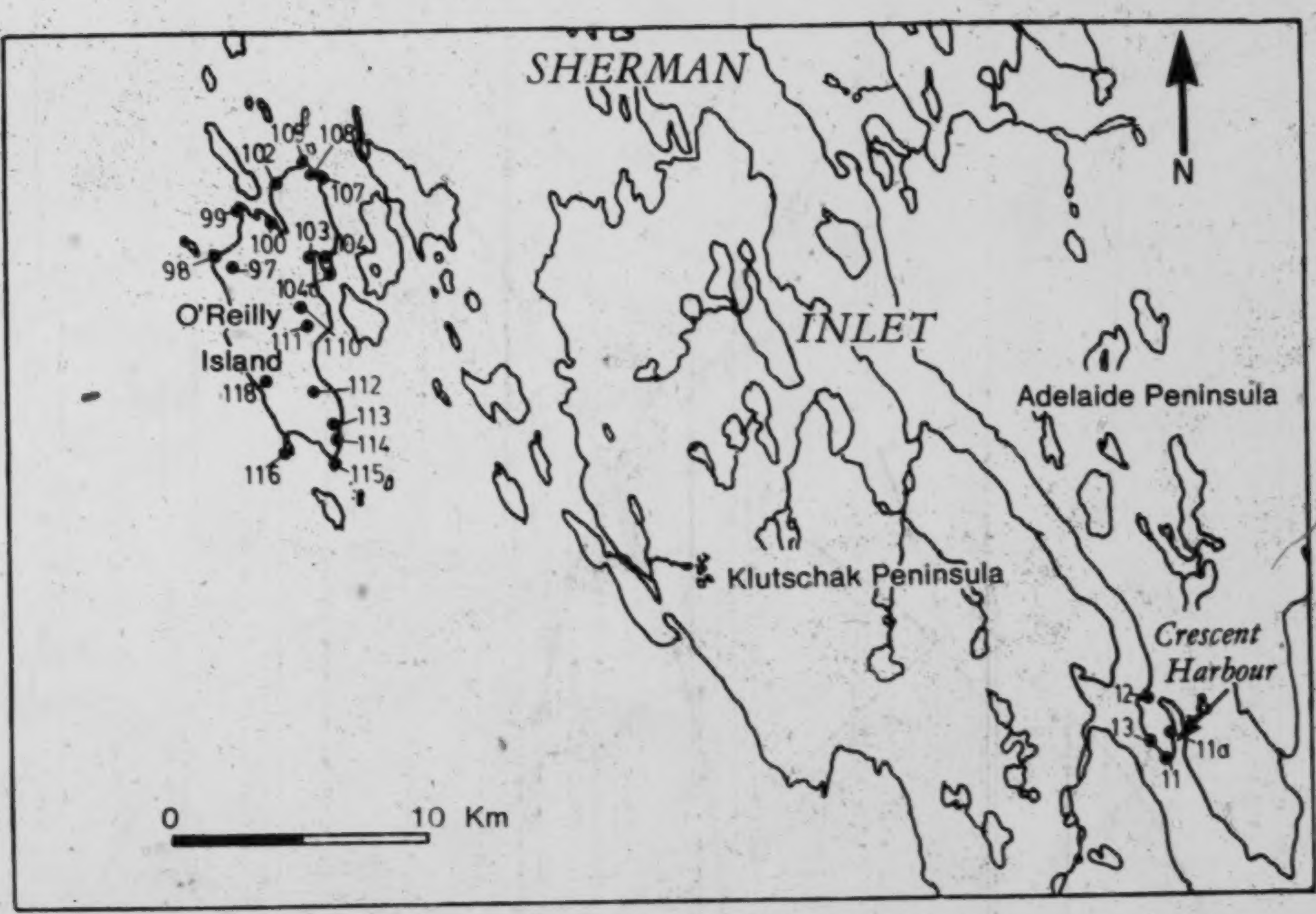

SHERMAN
INLET
N
105
108
102
107
99
100
103
104
98
97
104a
O'Reilly Island
111
110
118
112
113
114
115
116
Klutschak Peninsula
Adelaide Peninsula
Crescent Harbour
12
13
11a
11
0
10 Km

Figure 39. Location of sites recorded in the Adelaide Peninsula area.

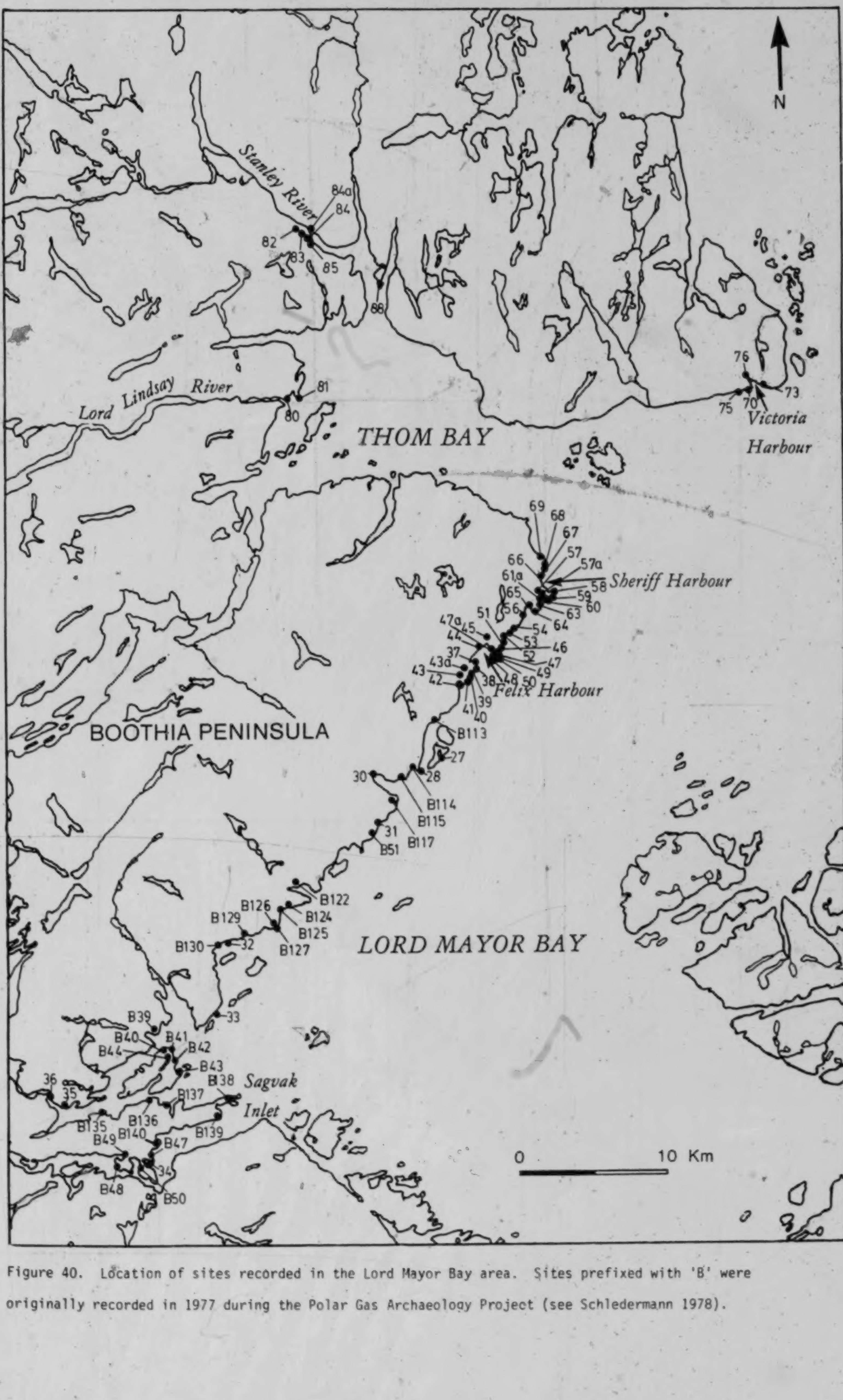

N
Stanley River
84a
84
82
83
85
88
Lord Lindsay River
81
80
THOM BAY
76
75
70
73
Victoria Harbour
69
68
67
57
57a
66
61a
Sheriff Harbour
58
59
60
65
56
63
64
51
54
53
46
47a
45
44
52
47
37
43a
49
50
48
38
43
42
Felix Harbour
39
41
40
BOOTHIA PENINSULA
B113
27
28
30
B114
B115
31
B117
B51
B122
B126
B124
B129
B125
B130
32
B127
LORD MAYOR BAY
33
B39
B40
B41
B44
B42
B43
B38
Sagvak Inlet
36
35
B137
B136
B135
B139
B140
B49
B47
34
B48
B50
0
10 Km

Figure 40. Location of sites recorded in the Lord Mayor Bay area. Sites prefixed with 'B' were originally recorded in 1977 during the Polar Gas Archaeology Project (see Schledermann 1978).

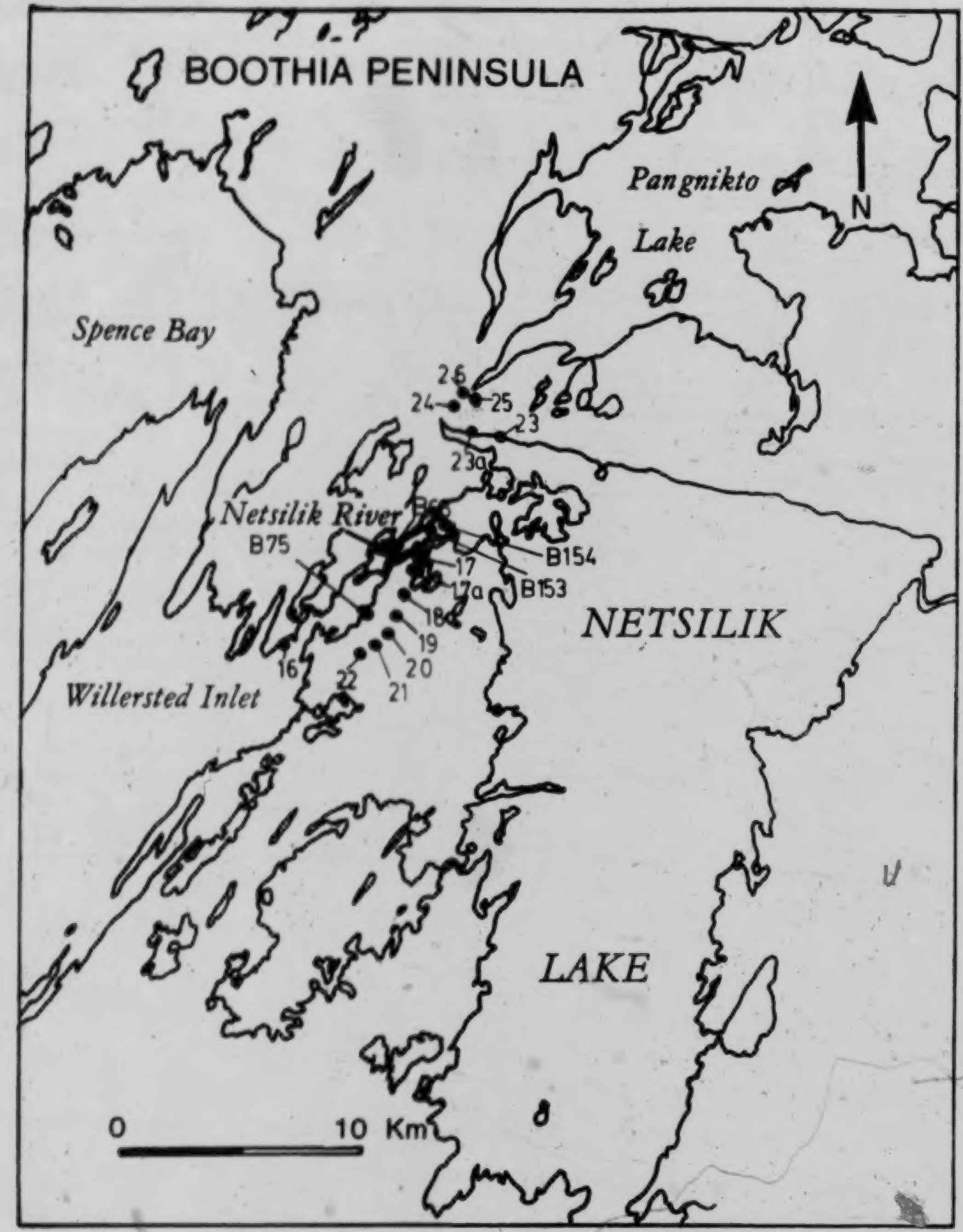

BOOTHIA PENINSULA
Pangnikto
Lake
N
Spence Bay
26
24
25
23
23a
Netsilik River
B75
B154
17
17a
B153
18
19
20
21
22
16
Willersted Inlet
NETSILIK
LAKE
0
10 Km

Figure 41. Location of sites recorded in the Netsilik Lake area. Sites prefixed with 'B' were originally recorded during the Polar Gas Archaeology Project (see Schledermann 1978).

Table 5. Site Data Summary - Creswell Bay.

Site No.	Semisubterranean Dwellings		Snow Dwelling Scatters	Tent Rings	Caches		Locations		Site/ Component Age
	Heavy	Light			Boulder	Pit	High-Bulk	Low-Bulk	
80-28				1	1			HB	CT
80-29					6				CT
80-30					1				CT
80-31					2			HB	CT
80-32								FT	CT
80-33				6	13				CT
80-34				15	10				CT
80-35				3	2				CT
80-36a				7	5				CT
80-36b				2	9			FT	CT
80-37				1					CT
80-38				3	3				CT
80-39b				14	15			FT	CT
80-43				1					CT
BW-1							BW3		CT
80-44				1					CT
80-45a				2					CT
80-45b				1					CT
80-46a				1					CT
80-46b				1					CT
80-47				1					CT
80-48				1					CT
BW-3							BW1		CT
BW-4							BW1		CT
80-49				2	1	3	BW1		CT
B-5							BW1		CT
B-6							BW1		CT
80-50a				3					CT
80-50b				11	2				CT
80-50c				9	4		BW2		CT
80-51a				19	5		BW1		CT
80-51b				1					CT
80-51c				1					CT
80-52				1					CT
BW-7							BW1		CT
80-53				21	10		BW5		CT
80-54				45	10	15			CT
80-55a							BW1		CT
80-55b				1			BW1		CT
80-55c				1			BW1		CT
80-56				1					CT
80-57a				6					CT
80-57b					1				CT
80-58a	26					75e			CT

Table 5. Continued.

Site No.	Semisubterranean Dwellings		Snow Dwelling Scatters	Tent Rings	Caches		Locations		Site/Component Age
	Heavy	Light			Boulder	Pit	High-Bulk	Low-Bulk	
BW-8							BW1		CT
80-60				6		5	BW2		CT
80-60a							BW1		CT
80-61				2		5			CT
80-62				7		5			CT
80-63						24			CT
BW-9							BW1		CT
80-64				2		2	BW1		CT
80-65				1					CT
BW-10							BW1		CT
80-67				1		2			CT
80-70				1					CT
BW-11							BW1		CT
80-71				2					CT
80-73a									CT
80-73b				43(2)	10e				CT
80-75				1			BW1		CT
80-76				2					CT
80-77				1					CT
80-78				1					CT
80-80a				1					CT
80-80b				7	3				CT
80-80c				1					CT
80-81				1			BW1		CT
80-81a				1					CT
BW-12							BW1		CT
80-82				1					CT
80-83				10	5				CT
BW-12a							BW4		CT
BW-13							BW1		CT
BW-14							BW3		CT
80-85				1					CT
80-86	11					35e			CT
80-87				6		25e			CT
80-88				7			BW10		CT
80-89				6	34		BW9		CT
BW-15							BW4		CT
80-90						40	BW1		CT
80-91					5				CT
80-92a				35	108	200e	BW36		CT
80-92b						300e	BW9		CT
80-92c						200e	BW8		CT

Table 5. Continued.

Site No.	Semisubterranean Dwellings		Snow Dwelling Scatters	Tent Rings	Caches		Locations		Site/Component Age
	Heavy	Light			Boulder	Pit	High-Bulk	Low-Bulk	
80-93	20e			30e					CT
80-94					2				CT
80-95				50e	70	100e			CT
80-96	39			10e	10	20e			CT
80-101				1	2				CT
80-102				1	2				CT
80-105				10	6				CT
80-107				40e(1)	10				CT
80-108				10e	10e				CT
80-109				12e	4e				CT
80-110a				20e	10e		BW3		CT
80-110b				30e	60e	50	BW6		CT
80-110c				50e	200e	50e			CT
80-111	12			10e					CT
80-112				5e	10				CT
80-113				10e	20e				CT
80-113a				5e	10e				CT

CT=Classic Thule; MT=Modified Thule; EH=Early Historic; LH=Late Historic; BW3=Minimum Number of bowhead whales represented at location; CDS=Caribou Drive System; FT=Fox Trap; HB=Hunting Blind; AEM=Abandoned Explorers' Material; DW=Driftwood; STT=Steatite Quarry; e=estimate.

Table 6. Site Data Summary - Aston Bay.

Site No.	Semisubterranean Dwellings		Snow Dwelling Scatters	Tent Rings	Caches		Locations		Site/ Component Age
	Heavy	Light			Boulder	Pit	High-Bulk	Low-Bulk	
80-126		5		9	1	1			CT
B-20							BW1		CT
80-127				11	2				CT
80-128				1	1				CT
80-129				3	2				CT
80-130		3			4				CT
80-131				7	11				CT
80-132					1				CT
80-133				5	7				CT
80-134		4		1		1			CT
80-135				25e	45e	25e	BW5		CT
80-136		5		6					CT
80-137				6					CT
80-138a				5	4				CT
80-138b				2					CT
80-139				1					CT
80-140a				5	4				CT
80-140b				7	2				CT
80-141				3					CT
B-21							BW1		CT
80-143b				10					CT
80-143d				10	1				CT
80-144				1					CT
80-145				7					CT
80-146a				6			BW1		CT
80-146b				13	2				CT
80-147				1					CT
B-22							BW1		CT

Table 6. Continued.

Site No.	Semisubterranean Dwellings		Snow Dwelling Scatters	Tent Rings	Caches		Locations		Site/ Component Age
	Heavy	Light			Boulder	Pit	High-Bulk	Low-Bulk	
80-149		5							CT
80-150				2					CT
80-151					3				CT
80-153				3					CT
80-154				1	1				CT
80-157a				7					CT
80-157b				1					CT
80-160				4	3				CT
80-161				2	2				CT
80-162				5					CT
B-23							BW1		CT
80-164a		9		7					CT

Key as for Table 5.

Table 7. Site Data Summary - King William Island.

Site No.	Semisubterranean Dwellings		Snow Dwelling Scatters	Tent Rings	Caches		Locations		Site/ Component Age
	Heavy	Light			Boulder	Pit	High-Bulk	Low-Bulk	
81-4		8		3					CT
81-5		5		10	1				CT
81-6a				14	12			HB	CT
81-6b				3	10				CT
81-7				4	5				MT
81-8a				3	1				CT
81-8b				2	4				CT
81-9				14					LH
81-9a				3					MT
81-9b				6					MT
81-9c				3					MT
81-9d				2					CT
81-10				1	1				LH
81-10a				1					LH
81-10b				1					LH
81-11				5	2				MT
81-12				6	2			HB	LH
81-13				2	1				LH
81-14				1					LH
81-15				1					LH
81-16				1					LH
81-18				1					LH
81-19				1					LH
81-20				1					LH
81-20				3					CT
81-21				1					CT
81-22				1					LH
81-23				5	5				MT

Table 7. Continued.

Site No.	Semisubterranean Dwellings		Snow Dwelling Scatters	Tent Rings	Caches		Locations		Site/Component Age
	Heavy	Light			Boulder	Pit	High-Bulk	Low-Bulk	
81-24				3					LH
81-24				1	2				CT
81-26				1	1				MT
81-27				2					MT
81-28				1					CT
81-29				5	3				MT
81-30				4	5				MT
81-30a				1					LH
81-30a				2	8				EH
81-31				2	3				CT
81-31				1					LH
81-31a				4	~~4~~				MT
81-31a				1				FT	LH
81-32								FT	LH
81-33				5					MT
81-35				4	10				MT
81-35								FT	LH
81-36				2	2				CT
81-37				2	1				EH
81-38				2					EH
81-40				1	2				LH
81-41				3	5				CT
81-41a					1				MT
81-42				1					MT
81-42					7				MT
81-43					2				MT
81-44				5	2				MT
81-45				4	3				MT

Table 7. Continued.

Site No.	Semisubterranean Dwellings Heavy	Semisubterranean Dwellings Light	Snow Dwelling Scatters	Tent Rings	Caches Boulder	Caches Pit	Locations High-Bulk	Locations Low-Bulk	Site/ Component Age
81-46				6	2				LH
81-47				1	1				MT
81-48				1					CT
81-48a					20				CT
81-49				1	3				MT
81-50					4				EH
81-51				3					EH
81-52		10		1	7				CT
81-53				15	10				CT
81-53				3					LH
81-54		10		10	3				CT
81-55a				2					LH
81-55b				8	10				EH
81-55c				2					CT
81-56				3	1				LH
81-57				10					LH
81-58				10					LH
81-59				3	4				LH
81-60				6	1				LH
81-61	20	15		40e	50e				CT
81-61				10e	10e				LH
81-62				10e	12				MT
81-63					6				CT
81-63a					12				CT
81-63b					4				MT
81-64				6	2				LH
81-65				3					MT
81-66				5	3				LH

Table 7. Continued.

Site No.	Semisubterranean Dwellings Heavy	Semisubterranean Dwellings Light	Snow Dwelling Scatters	Tent Rings	Caches Boulder	Caches Pit	Locations High-Bulk	Locations Low-Bulk	Site/ Component Age
81-67				2	2				LH
81-67a					5				CT
81-67b					10				LH
81-68				2	4				MT
81-69				3	5				MT
81-69a				2	1				CT
81-70				3	5				LH
81-71				1	2				MT
81-72a				1					LH
81-73		11		7	2				CT
81-74				1					LH
81-75				2	1				MT

Key as for Table 5.

Table 8. Site Data Summary - Sherman Inlet and O'Keilly Island, Adelaide Peninsula.

Site No.	Semisubterranean Dwellings		Snow Dwelling Scatters	Tent Rings	Caches		Locations		Site/ Component Age
	Heavy	Light			Boulder	Pit	High-Bulk	Low-Bulk	
81-97				1	2			AEM	EH
81-98				22	21			AEM DW	MT/EH
81-99a				1					LH
81-99b				2				DW	LH
81-99c				2	3			DW	CT
81-100								HB	MT
81-102				1	2				LH
81-103				1	2				LH
81-104				1	4				CT
81-104a				1	2				CT
81-107				9	1				LH
81-107				1					CT
81-108				8	5				CT
81-108				2					LH
81-109				5	4			AEM DW	LH
81-110				1					MT
81-111				1					CT
81-112				1					CT
81-113				2					LH
81-114				2					CT
81-115				11	3				LH
81-116				1	1				LH
81-11	17	19		200e	200e				CT
81-11				10e					MT/EH
82-11a				10	11				MT
82-12				30e	70e		CDS		CT
82-13				7	2			FT	LH

Key as for Table 5.

Table 9. Site Data Summary - Lord Mayor Bay.

Site No.	Semisubterranean Dwellings		Snow Dwelling Scatters	Tent Rings	Caches		Locations		Site/ Component Age
	Heavy	Light			Boulder	Pit	High-Bulk	Low-Bulk	
81-80	6			5	20e				CT
81-80				5	20e				MT/EH
81-80				75	75e				LH
81-81		2	15e	28	10e				LH
81-82				2	8				MT
81-83				2	2				MT
81-84				9					LH
81-84a				1					CT
81-84a				1	1				LH
81-85		2							CT
81-88				1					EH
82-27				10e	5e				MT
82-28				6	3				CT
82-30				4					LH
82-31				2					LH
82-32				10e					MT
82-33				3					CT
82-33				5	5				LH
82-34				3					MT
82-34				5	7				LH
82-35								STT	LH
82-36				10e	10e				LH
82-36				20e	10e				MT
82-37				2	1				MT
82-37				2	2				LH
82-38				2	1				MT
82-39				1					MT

Table 9. Continued.

Site No.	Semisubterranean Dwellings		Snow Dwelling Scatters	Tent Rings	Caches		Locations		Site/ Component Age
	Heavy	Light			Boulder	Pit	High-Bulk	Low-Bulk	
82-40				3	2				LH
82-41				2	1				LH
82-42				5					CT
82-42				2					LH
82-43				2					MT
82-43				2					MT
82-44				1					LH
82-45			10	2					LH
82-45				2					CT
82-46				3	1				MT
82-46				26	7				LH
82-47a			9	27	11				LH
82-47b				8	10				LH
82-47c				3	1				LH
82-48			3	6	3				EH
82-49								AEM	EH
82-49								AEM	LH
82-50				2					MT
82-50				28	25				LH
82-51				4	1				LH
82-52				5	4				LH
82-53				7	4				CT
82-54				11	5				LH
82-54				3	3				CT
82-54				2					CT
82-56				3					CT
82-56				12					LH

Table 9. Continued.

Site No.	Semisubterranean Dwellings		Snow Dwelling Scatters	Tent Rings	Caches		Locations		Site/ Component Age
	Heavy	Light			Boulder	Pit	High-Bulk	Low-Bulk	
82-57				4					EH
82-57				3	1				CT
82-57				2					LH
82-57a				3	10				LH
82-58				1					LH
82-59				27	12				LH
82-60				1	3				LH
82-60				2					LH
82-60				17	3				LH
82-60a					3				MT
82-61					4				LH
82-61a				1					CT
82-63					1			FT	MT
82-64				1				FT	CT
82-65				2					CT
82-65				2	1				LH
82-65				2					LH
82-66				2	1				LH
82-67				3	7				LH
82-68				6	11			FT	MT
82-69				1	1				LH
82-70				7	6				EH
82-70				3					LH
82-73				17	15				CT
82-75				8	6				MT
82-75				3					EHJ

Table 9. Continued.

Site No.	Semisubterranean Dwellings		Snow Dwelling Scatters	Tent Rings	Caches		Locations		Site/ Component Age
	Heavy	Light			Boulder	Pit	High-Bulk	Low-Bulk	
82-76								AEM	EH/LH
B-39				1					MT
B-40				1	3				CT
B-40				11					LH
B-41				10e	10e				CT
B-42				7	5				MT
B-43					2			2FT	MT
B-44				5					MT
B-47				12	9				MT
B-48				5	8				MT
B-49				11	12			3HB	CT
B-50				5	7				LH
B-51				15	3				LH
B-113				3	3				LH
B-114				5					CT
B-115				4					CT
B-117				4					MT
B-122				1					CT
B-124				1					LH
B-125				3					LH
B-126				1					LH
B-127				10e	5e				CT
B-129				2					LH
B-130				4					LH
B-135				15e	10e				CT

Table 9. Continued.

Site No.	Semisubterranean Dwellings		Snow Dwelling Scatters	Tent Rings	Caches		Locations		Site/ Component Age
	Heavy	Light			Boulder	Pit	High-Bulk	Low-Bulk	
B-136				5					CT
B-137				2					CT
B-138				3	11				LH
B-139				1					MT
B-140				5					MT

Key as for Table 5.

Table 10. Side Data Summary - Netsilik Lake.

Site No.	Semisubterranean Dwellings		Snow Dwelling Scatters	Tent Rings	Caches		Locations		Site/ Componen Age
	Heavy	Light			Boulder	Pit	High-Bulk	Low-Bulk	
82-16		4							CT
82-17-1				22	2				MT
82-17-2		10		8					CT
82-17a				2					LH
82-17a				25	9				MT
82-18				1	5				MT
82-19				2	2				LH
82-20				1	1				EH
82-21				7	1				EH
82-22				4	1				MT
82-23		6		8					CT
82-23				2	1				LH
82-23-1a				5	1				CT
82-23-1b				1					CT
82-23-1c				1					CT
82-24				10					LH
82-24				60	55		CDS		EH/MT
82-25a				1					LH
82-25a				5					EH
82-25b				12	6				EH
82-26				2	1				MT
B-66				12	10				LH
B-75				3	7				LH
B-153				4					MT
B-154				10					MT

Key as for Table 5.

Figure 42. Early Classic Thule site characteristics, Creswell Bay.

Legend:

△ 1-2 tent rings

○ 3-10 tent rings

○ 11-30 tent rings

○ 31-50 tent rings

○ greater than 50 tent rings

● 1-10 semisubterranean dwellings

● 11-30 semisubterranean dwellings

● 31-50 semisubterranean dwellings

◌ 1-10 snow dwelling features

◌ 11-30 snow dwelling features

K - site containing feature(s) interpreted as karigi

■ 1-10 caches

■ 11-30 caches

■ 31-50 caches

■ greater than 50 caches

High bulk locations:

bw► MNI of 1-5 bowhead whales (MNI indicated)

bw► MNI of 6+ bowhead whales (MNI indicated)

cds► caribou drive systems

fw► fish weir

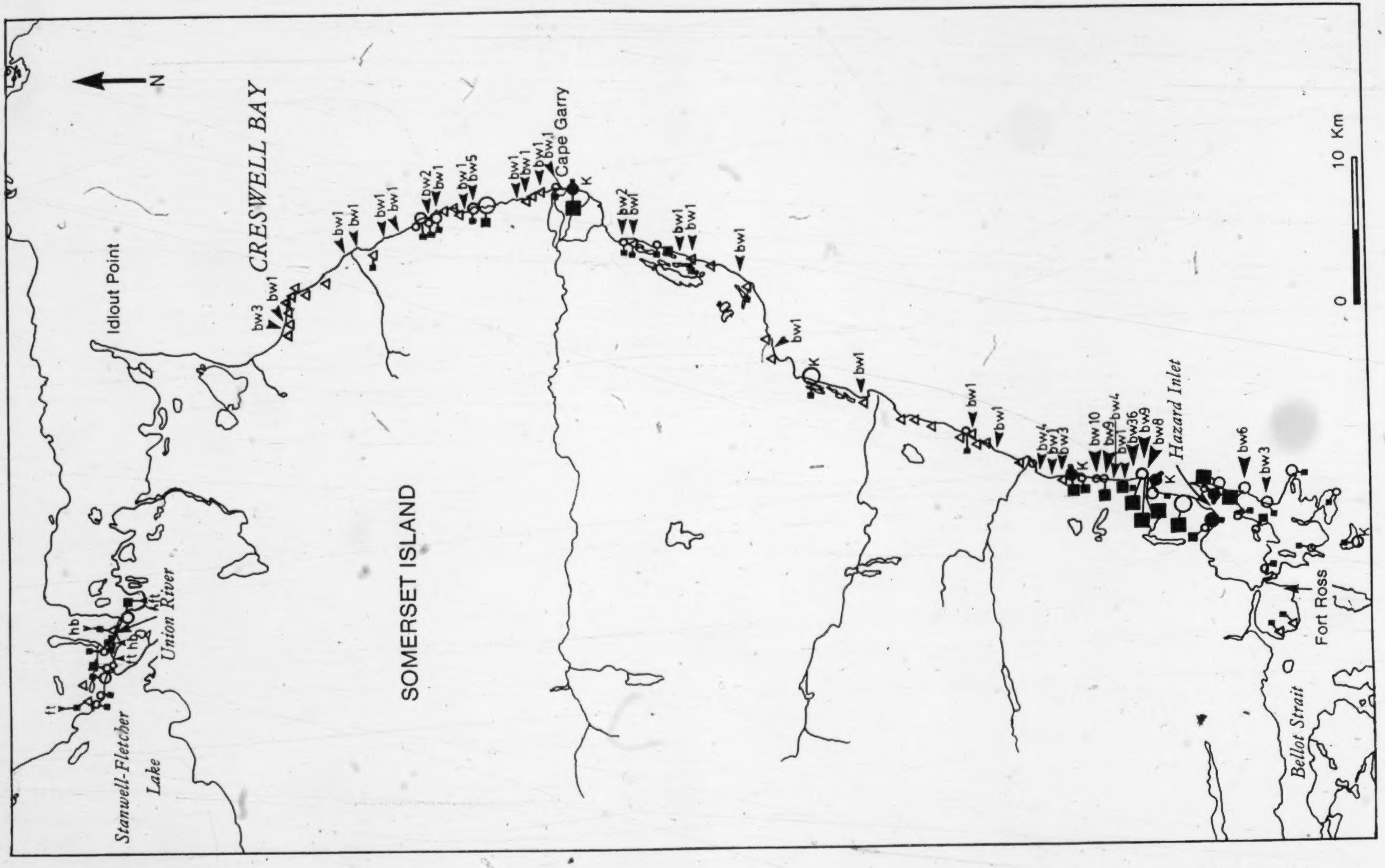
Low bulk locations:

ft► fox trap

aem► abandoned explorers' material

dw► driftwood

stt► steatite quarry


N
CRESWELL BAY
Idlout Point
Cape Garry
SOMERSET ISLAND
Stanwell-Fletcher
Lake
Union River
Hazard Inlet
Fort Ross
Bellot Strait
0
10 Km
bw1
bw2
bw3
bw4
bw5
bw6
bw8
bw9
bw10
bw36
K
hb
ft

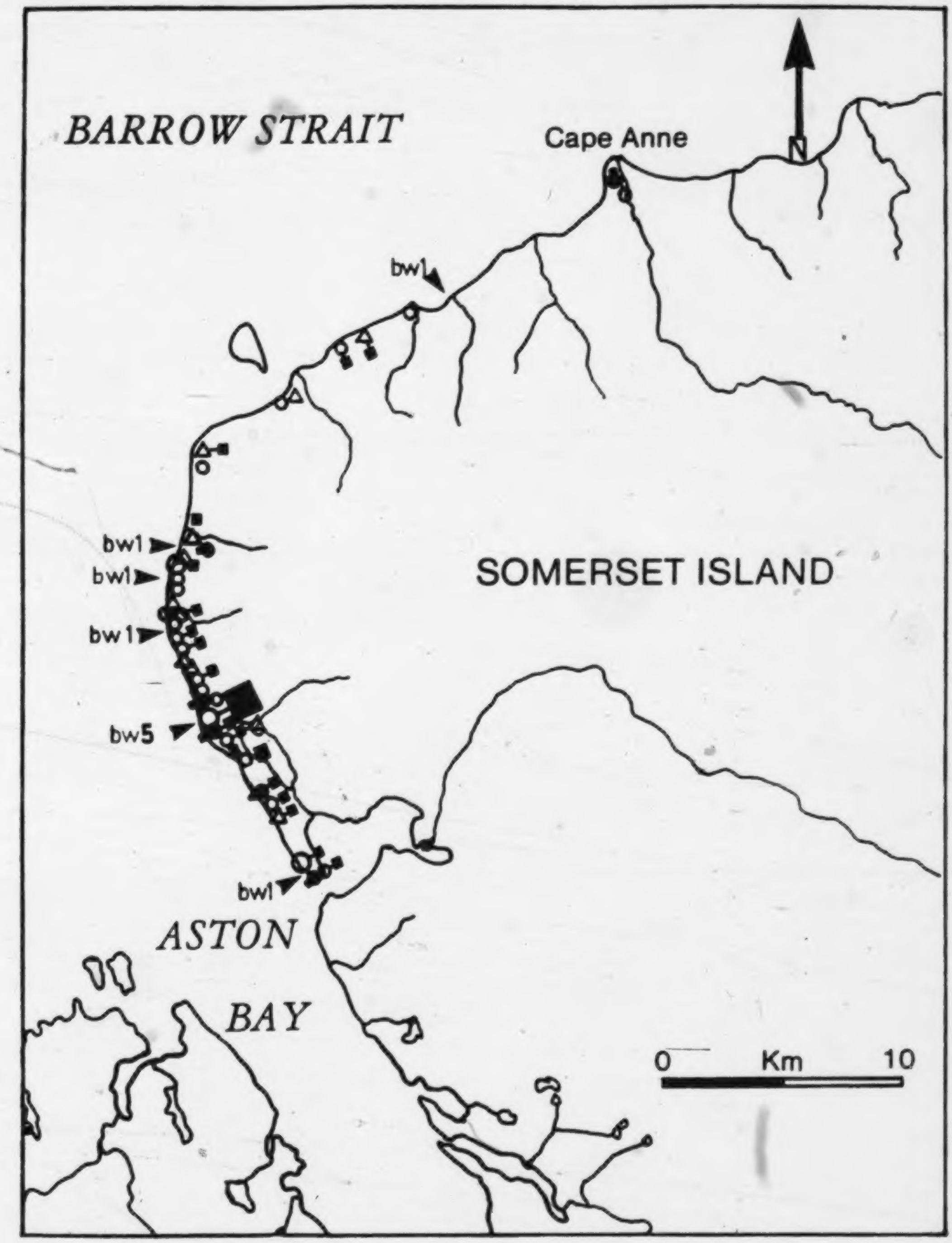

BARROW STRAIT
Cape Anne
N
bw1
bw1
bw1
bw1
bw5
bw1
SOMERSET ISLAND
ASTON
BAY
0
Km
10

Figure 43. Late Classic Thule site characteristics, Aston Bay. Legend as for Figure 42.

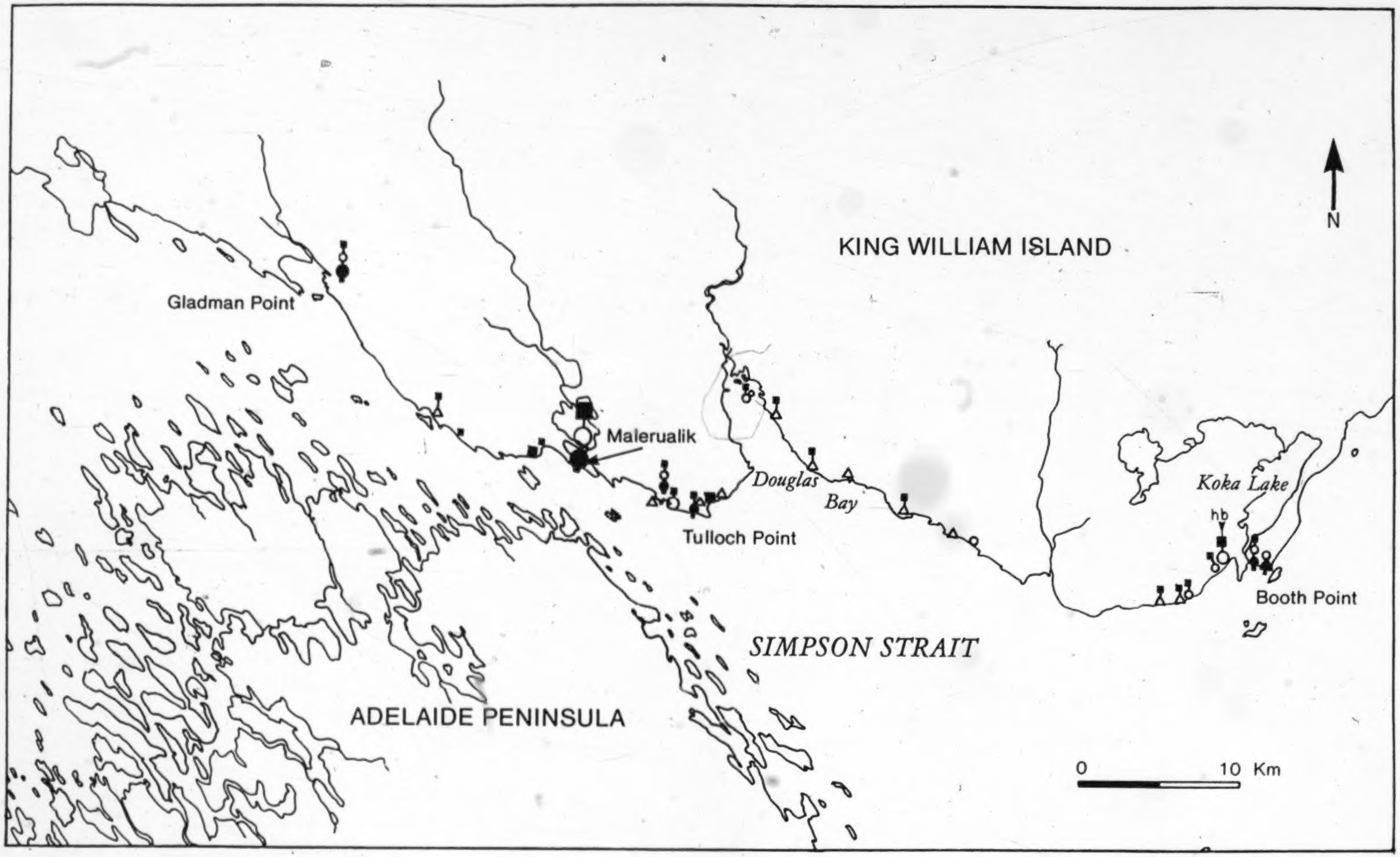

KING WILLIAM ISLAND
N
Gladman Point
Malerualik
Douglas Bay
Tulloch Point
Koka Lake
hb
Booth Point
SIMPSON STRAIT
ADELAIDE PENINSULA
0
10 Km

Figure 44. Classic Thule site characteristics, King William Island. Legend as for Figure 42.

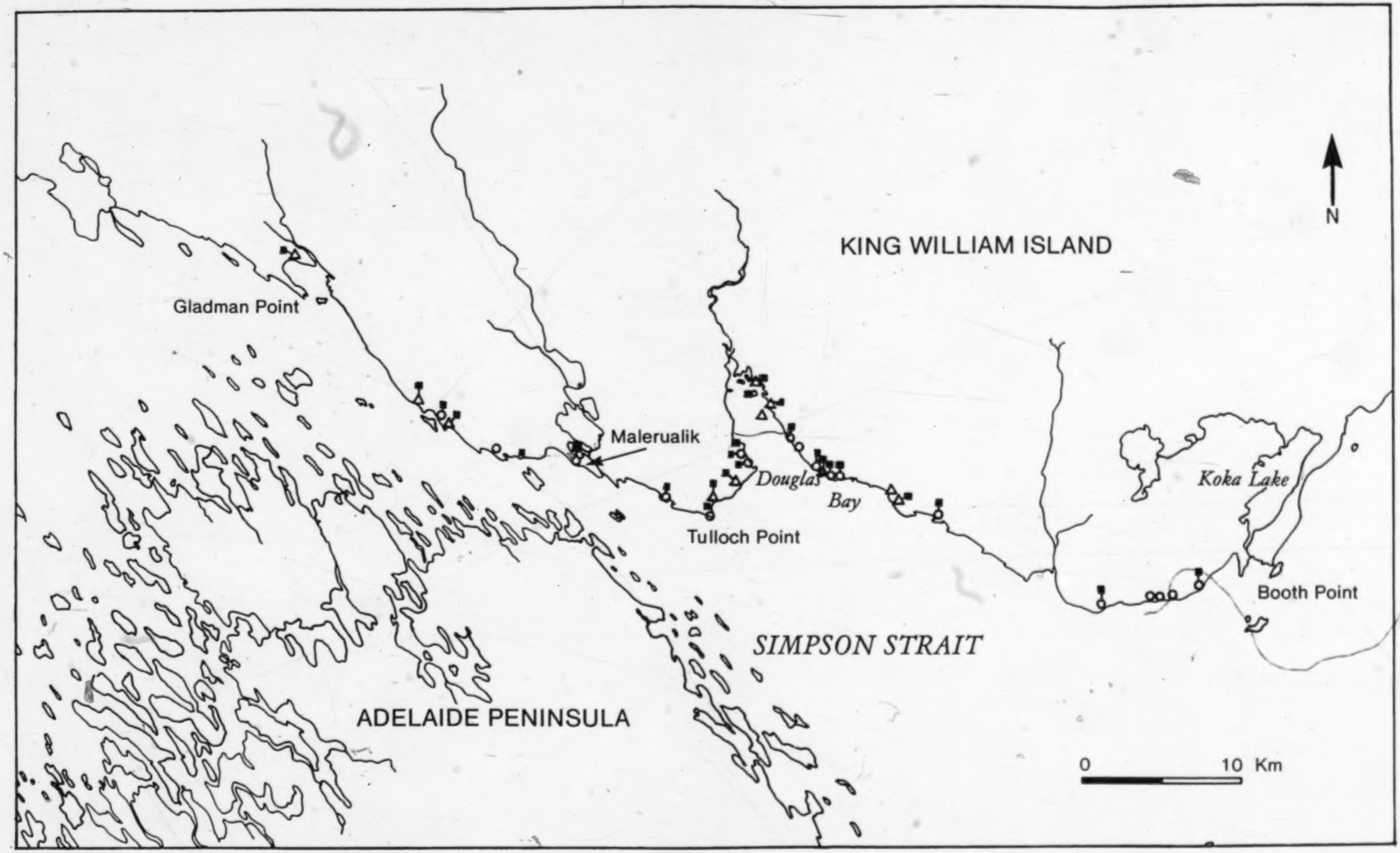

KING WILLIAM ISLAND
N
Gladman Point
Malerualik
Douglas Bay
Tulloch Point
Koka Lake
Booth Point
SIMPSON STRAIT
ADELAIDE PENINSULA
0
10 Km

Figure 45. Modified Thule-early Historic site characteristics, King William Island. Legend as for Figure 42.

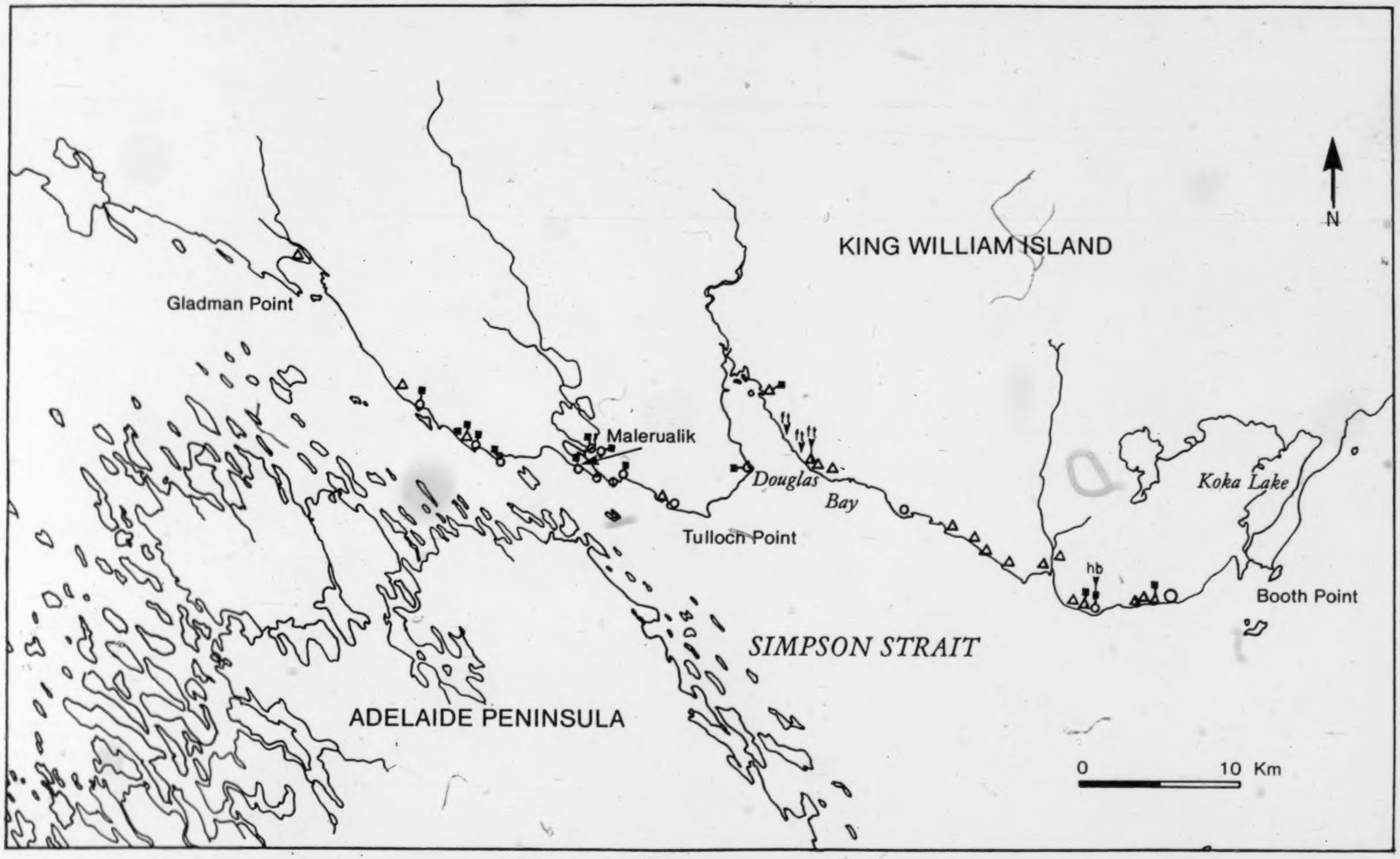

KING WILLIAM ISLAND
N
Gladman Point
Malerualik
Douglas
Bay
Tulloch Point
Koka Lake
hb
Booth Point
SIMPSON STRAIT
ADELAIDE PENINSULA
0
10 Km

Figure 46. Late Historic site characteristics, King William Island. Legend as for Figure 42.

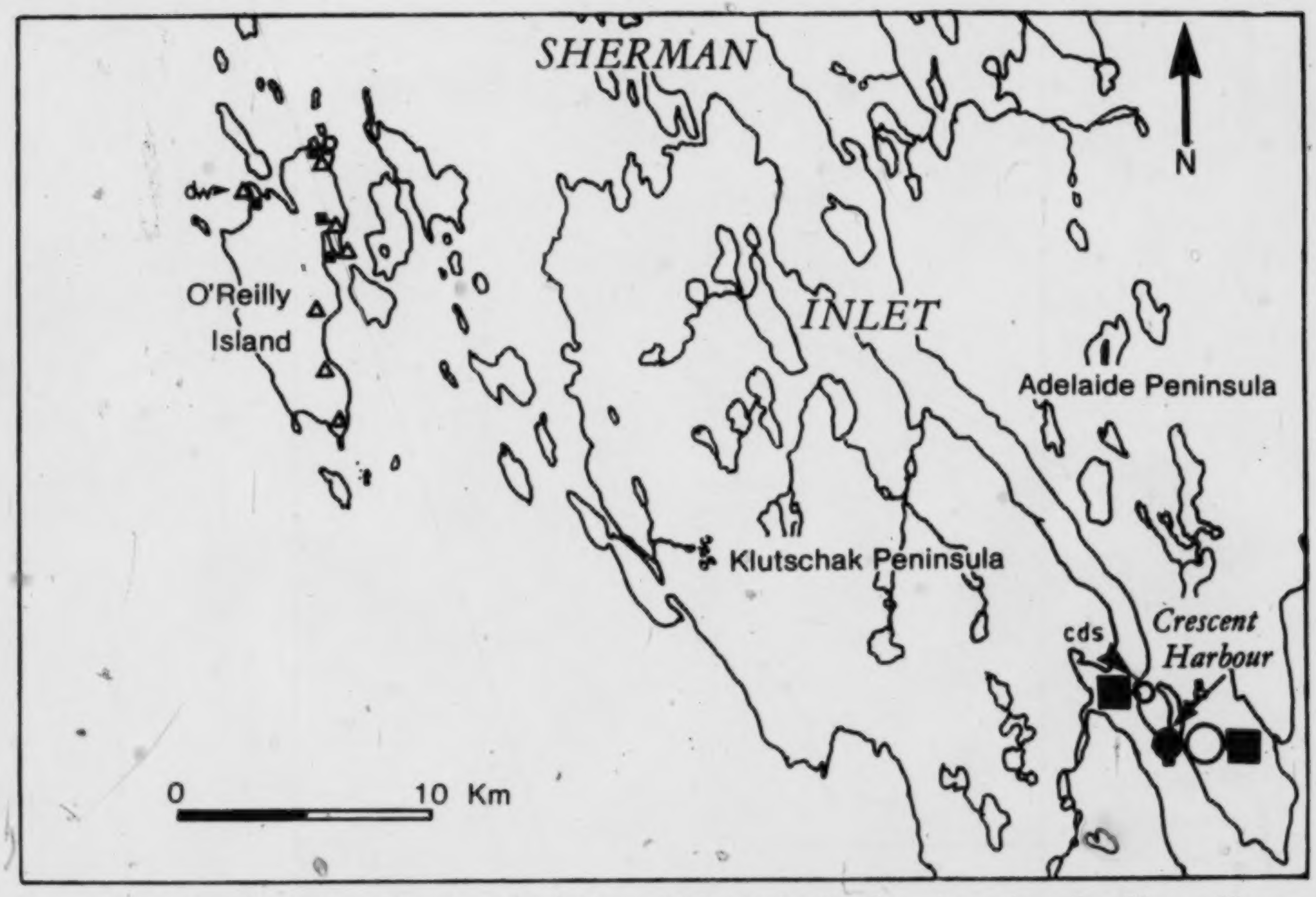

SHERMAN
INLET
N
dw
O'Reilly
Island
Adelaide Peninsula
Klutschak Peninsula
cds
Crescent
Harbour
0
10 Km

Figure 47. Classic Thule site characteristics, Adelaide Peninsula. Legend as for Figure 42.

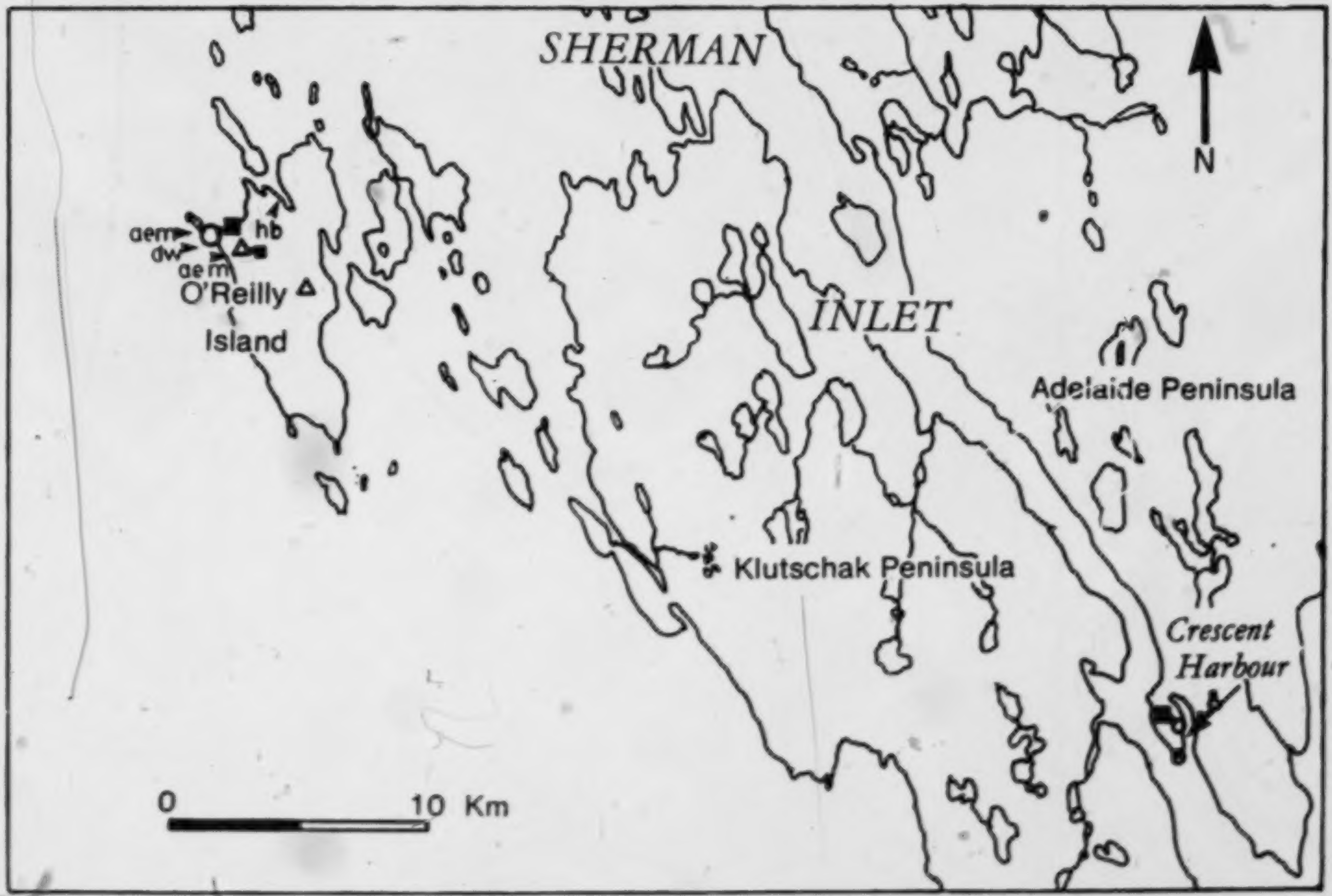

SHERMAN
INLET
N
aem
dw
aem
hb
O'Reilly
Island
Adelaide Peninsula
Klutschak Peninsula
Crescent
Harbour
0
10 Km

Figure 48. Modified Thule-early Historic site characteristics, Adelaide Peninsula. Legend as for Figure 42.

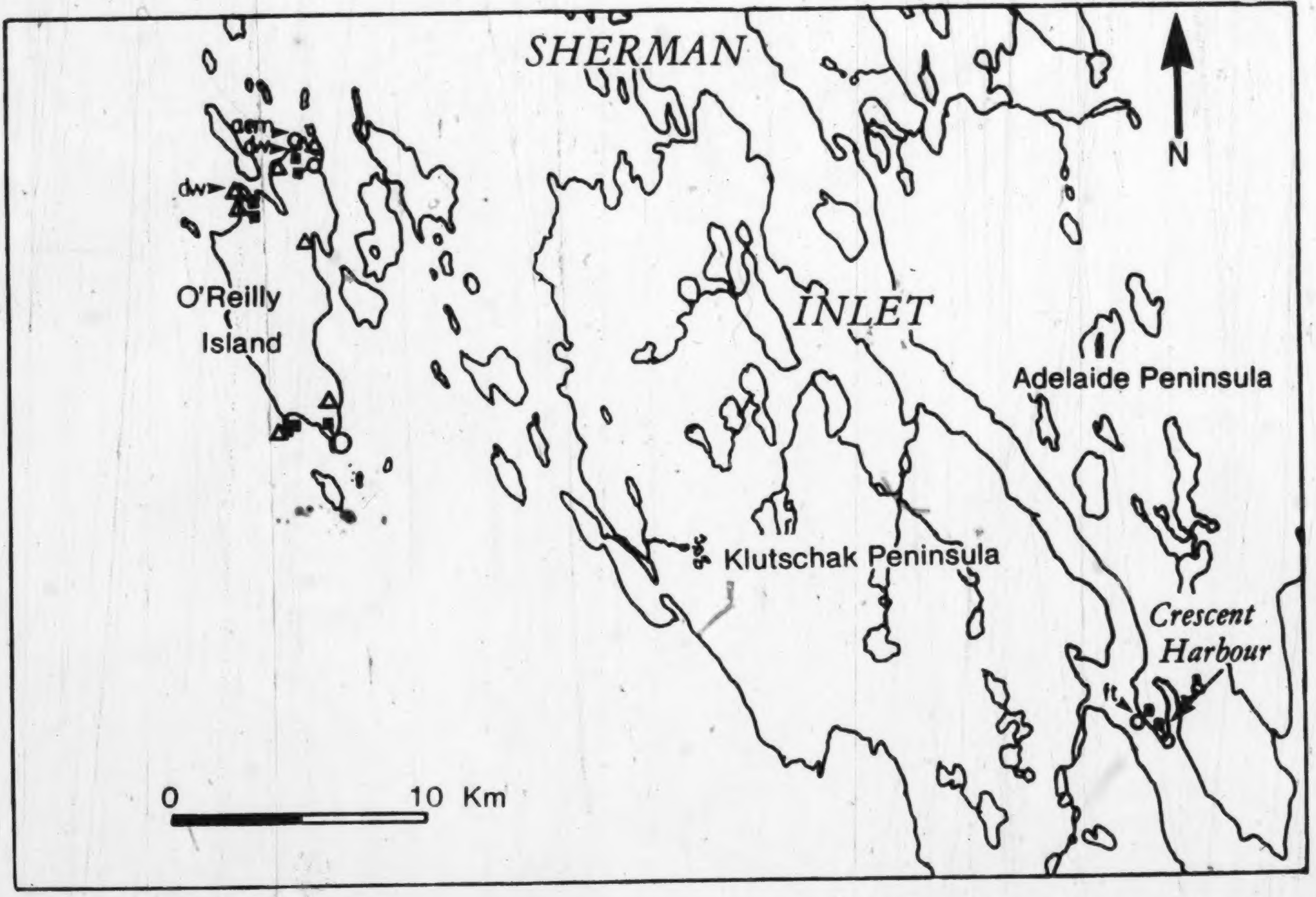

SHERMAN
INLET
N
cem
dw
dw
O'Reilly Island
Adelaide Peninsula
Klutschak Peninsula
Crescent Harbour
ft
0
10 Km

Figure 49. Late Historic site characteristics, Adelaide Peninsula. Legend as for Figure 42.

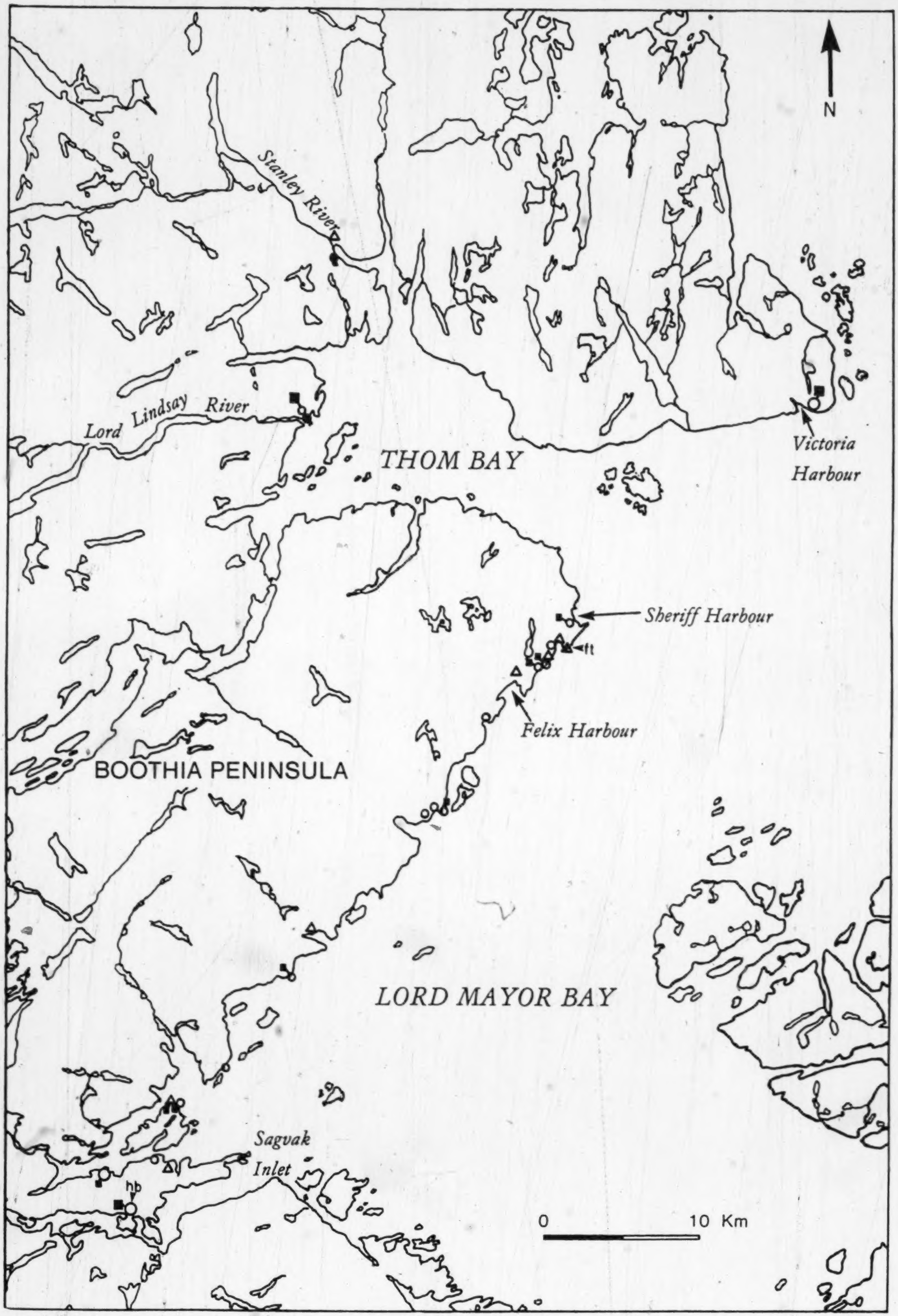

N
Stanley River
Lord Lindsay River
THOM BAY
Victoria Harbour
Sheriff Harbour
ft
Felix Harbour
BOOTHIA PENINSULA
LORD MAYOR BAY
Sagvak Inlet
hb
0
10 Km

Figure 50. Classic Thule site characteristics, Lord Mayor Bay. Legend as for Figure 42.

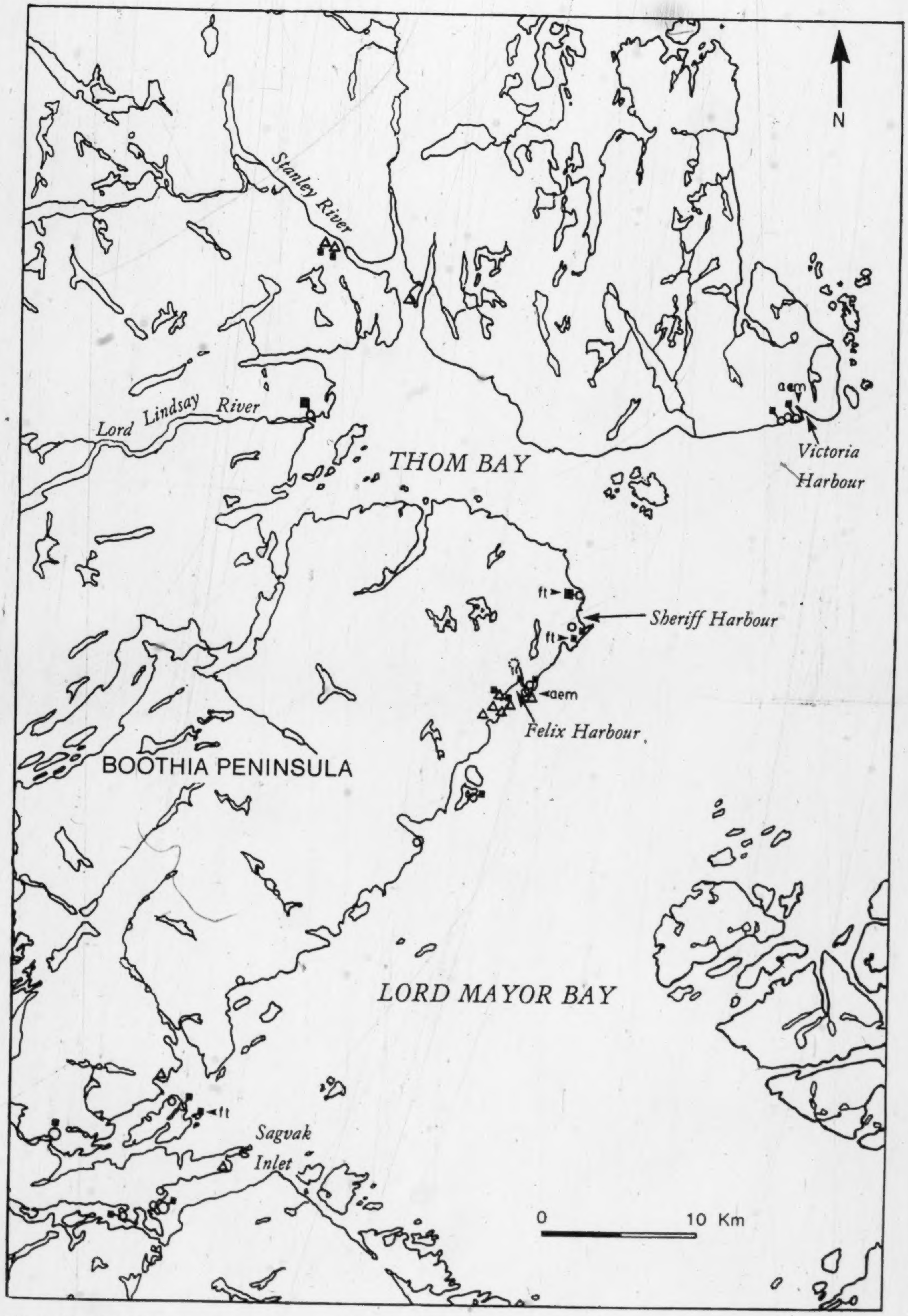

N
Stanley River
Lord Lindsay River
THOM BAY
Victoria Harbour
aem
ft
Sheriff Harbour
Felix Harbour
BOOTHIA PENINSULA
LORD MAYOR BAY
Sagvak Inlet
0
10 Km

Figure 51. Modified Thule-early Historic site characteristics, Lord Mayor Bay. Legend as for Figure 42.

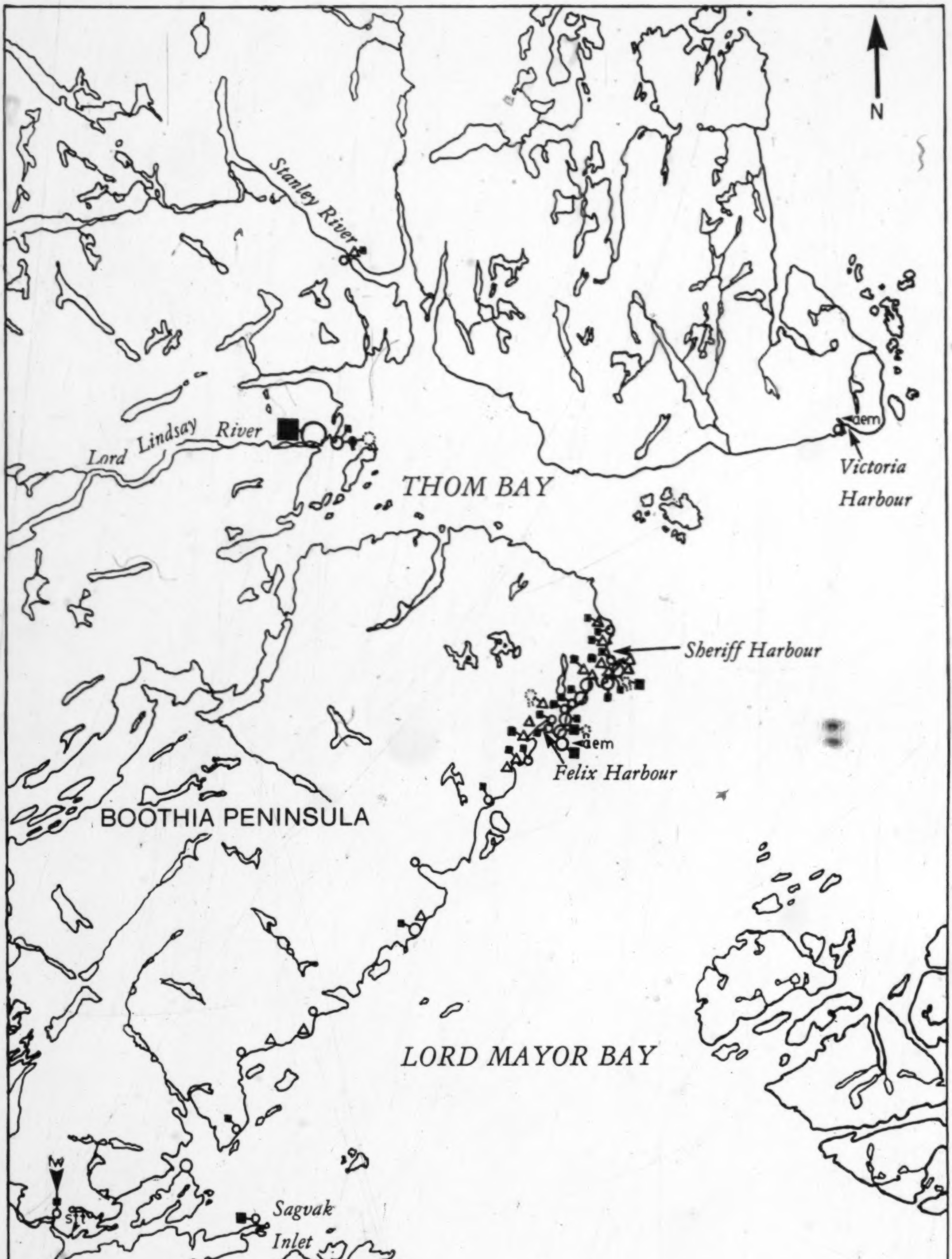

N
Stanley River
Lord Lindsay River
THOM BAY
Victoria Harbour
dem
Sheriff Harbour
Felix Harbour
dem
BOOTHIA PENINSULA
LORD MAYOR BAY
Sagvak Inlet
w
st
0
10 Km

Figure 52. Late Historic site characteristics, Lord Mayor Bay. Legend as for Figure 42.

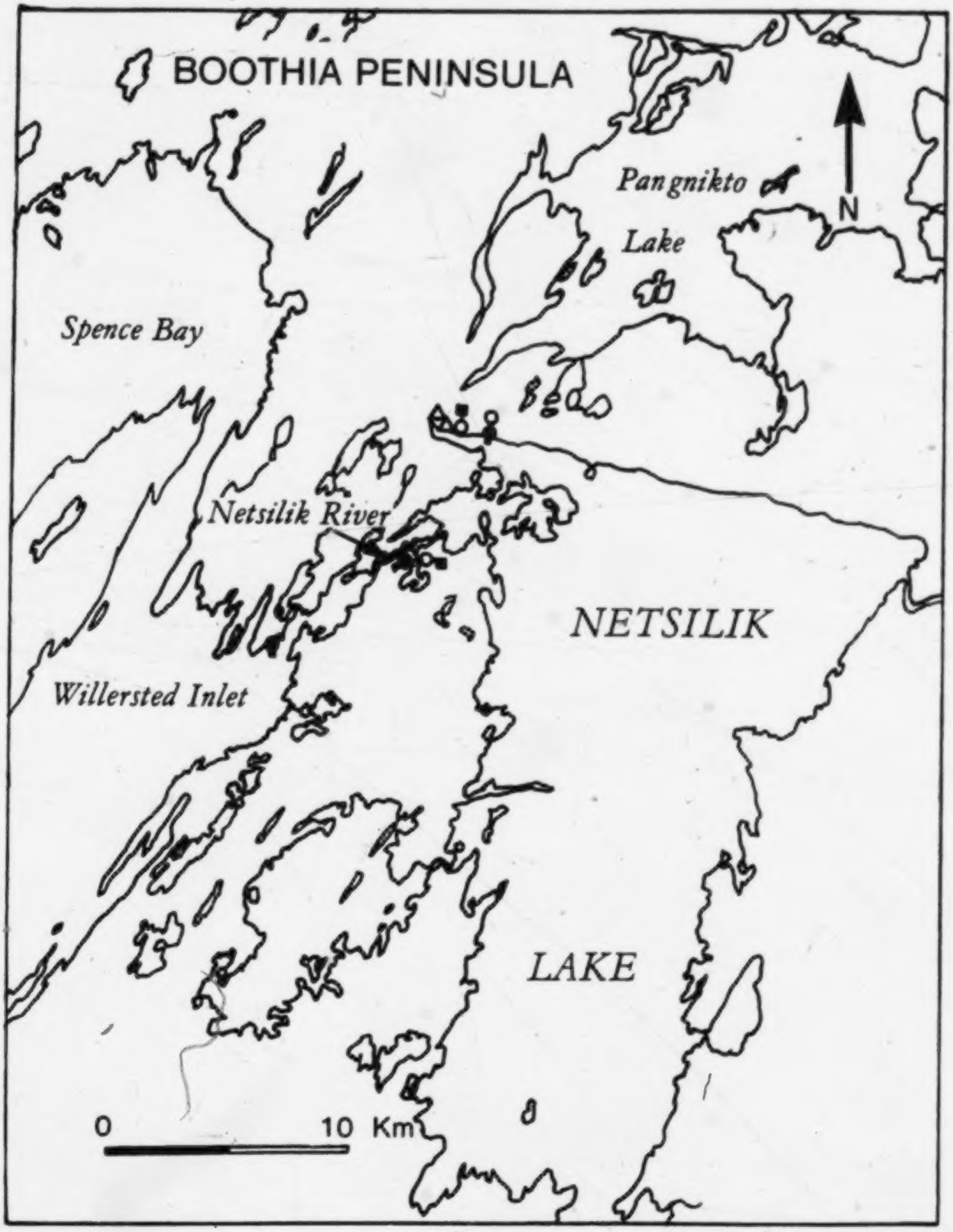

BOOTHIA PENINSULA
Pangnikto Lake
N
Spence Bay
Netsilik River
NETSILIK
Willersted Inlet
LAKE
0
10 Km

Figure 53. Classic Thule site characteristics, Netsilik Lake. Legend as for Figure 42.

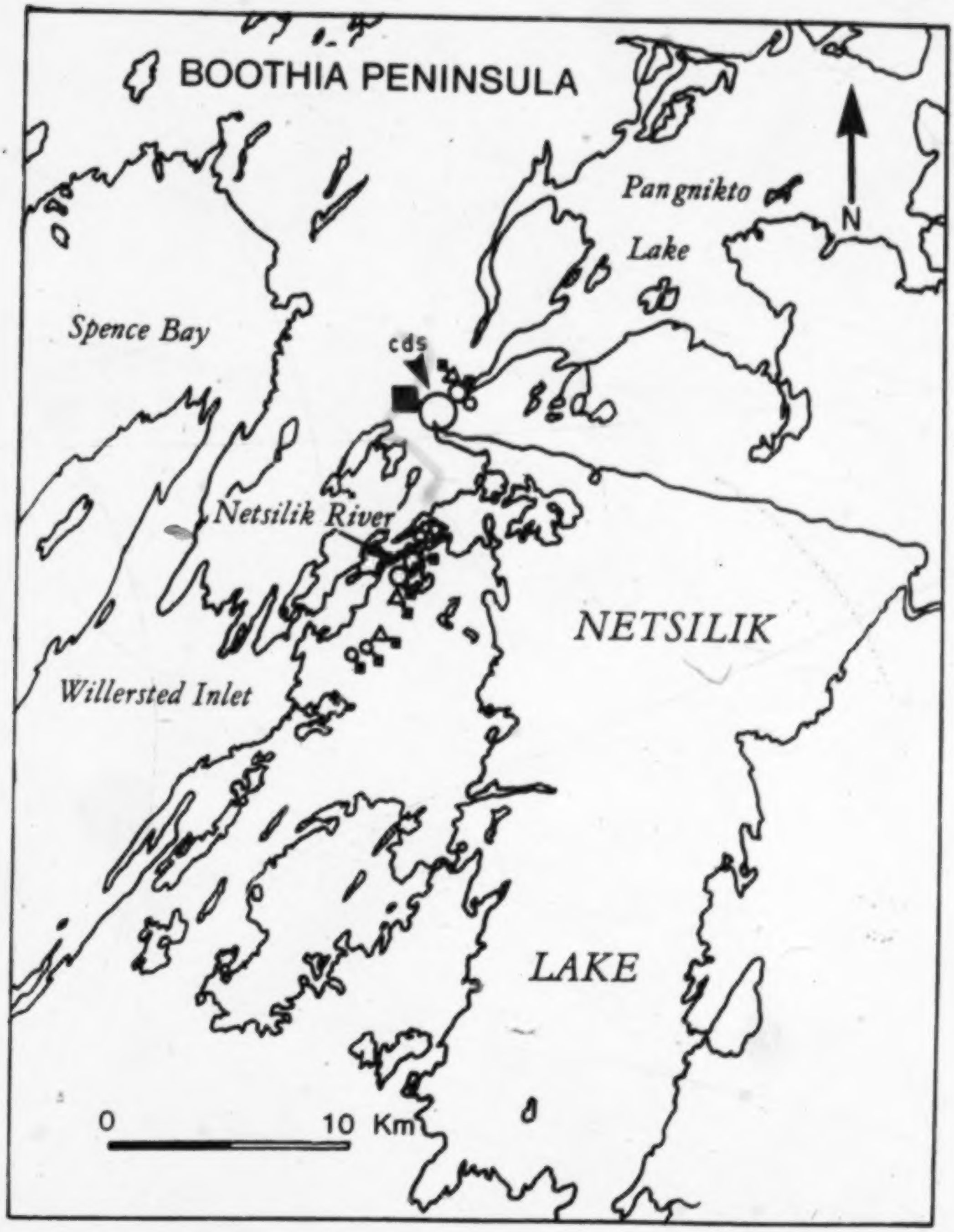

BOOTHIA PENINSULA
Pangnikto Lake
N
Spence Bay
cds
Netsilik River
NETSILIK
Willersted Inlet
LAKE
0
10 Km

Figure 54. Modified Thule-early Historic site characteristics, Netsilik Lake. Legend as for Figure 42.

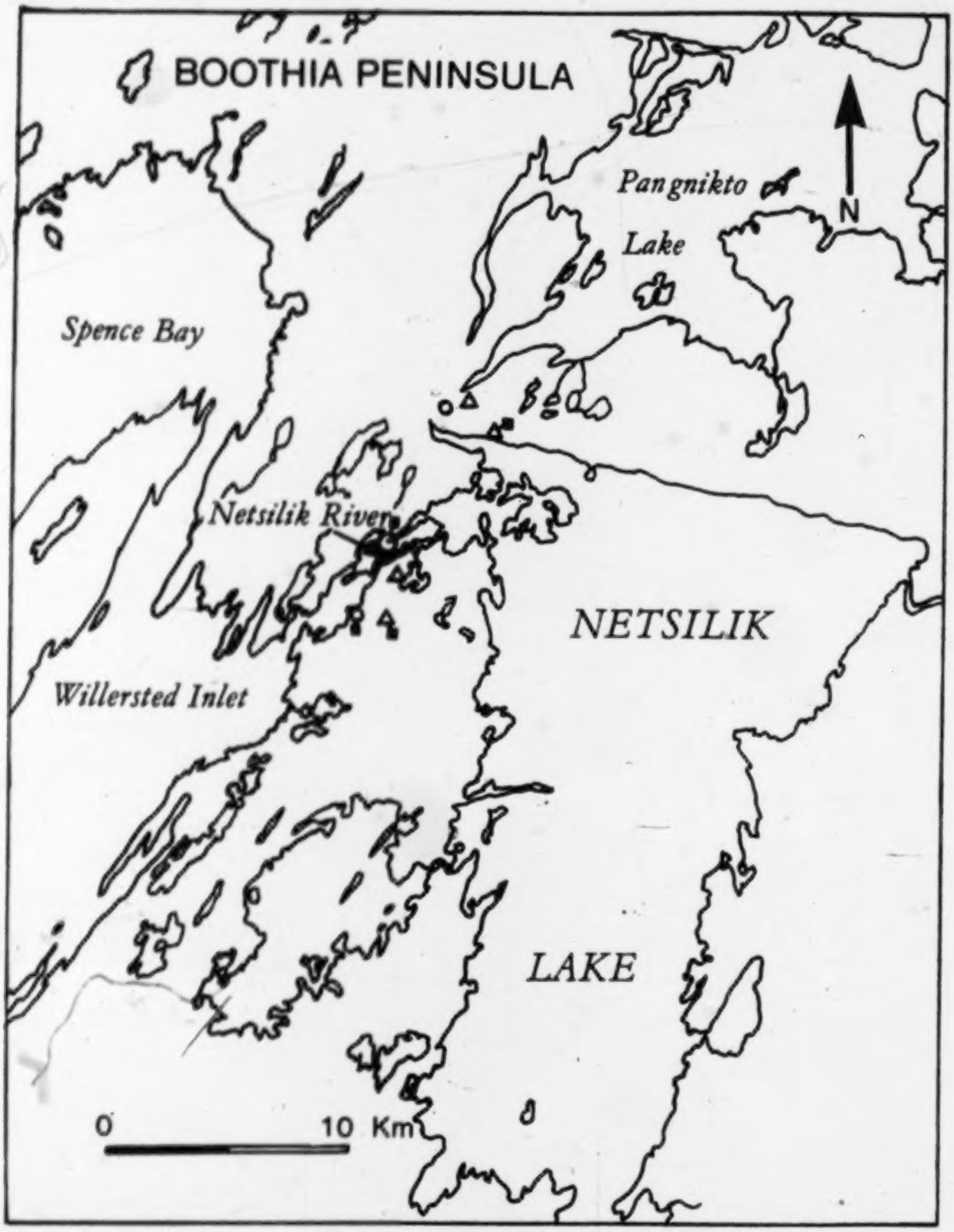

BOOTHIA PENINSULA
Pangnikto Lake
N
Spence Bay
Netsilik River
NETSILIK
Willersted Inlet
LAKE
0
10 Km

Figure 55. Late Historic site characteristics, Netsilik Lake. Legend as for Figure 42.

CHAPTER EIGHT:

HYPOTHESIS 1: TEST IMPLICATION RESULTS

HYPOTHESIS 1:

> A decrease in the distribution and abundance of bowhead whales in the northern part of the study area, and in barren ground caribou in the southern part of the study area, will be accompanied by a transformation of subsistence-settlement systems based primarily on collecting strategies to subsistence-settlement systems based primarily on foraging strategies.

Since, as previously discussed, definite Modified Thule occupations have not been recognized on Somerset Island, for purposes of comparison for this area early Classic Thule is compared to late Classic Thule following the early vs. late distinction made in Chapter 6. Since all but one of the eight semisubterranean dwelling sites at Creswell Bay are considered 'early' Classic Thule, and all six semisubterranean dwelling sites at Aston Bay are considered 'late' Classic associated tent ring, cache, and other site types in the respective areas, for the purposes of areal comparison, can be considered 'early' and 'late' Classic respectively. This is not to suggest that none of the features in Aston Bay could be early Classic Thule, or that none of the features (with the exception of the one identified site) in the Creswell Bay area could be late Classic Thule. However, it can be expected that northern hunter-gatherer groups, especially those with permanent residential base camps, will, for the most part, operate in culturally or ecologically defined zones. Certainly all historic Central Eskimo groups did so, although boundary definition was not uniform. In such instances, the permanent residential bases can be expected to occur within, and in large part define, territorial boundaries. Since identified early Classic Thule semisubeterranean dwelling sites are concentrated at Creswell Bay, and late Classic Thule semisubterranean dwelling sites are concentrated at Aston Bay, associated features within these two areas logically should relate to the residential base occupations. Keeping in mind the probable travelling distance from Creswell Bay to Aston Bay is approximately 200 km, it would seem highly unlikely that land use overlap would be major. Accordingly, it can be suggested that an overlap may alter slightly, but not significantly, early and late Classic Thule settlement patterns in the respective areas.

Test Implication 1

> "There should be a strong functional separation of Classic Thule sites into residential bases, "high-bulk" locations, field camps, caches, and stations, and this functional separation should decrease in Modified Thule and early Historic sites."

Comparison of frequencies of various site and/or component types according to cultural affiliation for the three major survey regions are presented in Figures 56-58. Component in this instance, and in all following test implications, refers to that physical component of a site consisting of a given feature type. For example, a site consisting of only four late Historic caches is referred to as a cache site. A site consisting of four late Historic caches and four late Historic tent rings has two components: a cache component and a tent ring component. There is a clear trend in both the northern whale area and the King William Island-Adelaide Peninsula region of the southern caribou area toward decreasing relative proportions of the logistically-related field camps and high-bulk locations and a corresponding increase in residential sites. On the other hand the trend is very poorly developed in the Lord Mayor Bay-Netsilik Lake region of the southern caribou area. The logistical-residential distinction for the Somerset Island and King William Island-Adelaide Peninsula regions is especially evident if the frequencies of tent ring number per site/component are compared (Figures 59-60), with field camps frequencies being considerably higher for early Classic Thule and Classic Thule, respectively. Conversely, there is very little difference in the Lord Mayor Bay-Netsilik Lake area (Figure 61).

Although the relative proportions of cache sites and/or components remain relatively constant, in each of the survey areas, if absolute cache site/component size is considered instead, there is a definite decrease in the relative proportions of larger sites/components in the Somerset Island and King William Island-Adelaide Peninsula region (Figures 62 amd 63). In the Lord Mayor Bay-Netsilik Lake region, on the other hand, the trends are generally similar although the largest individual sites are associated with Modified Thule-early Historic occupations (Figure 64).

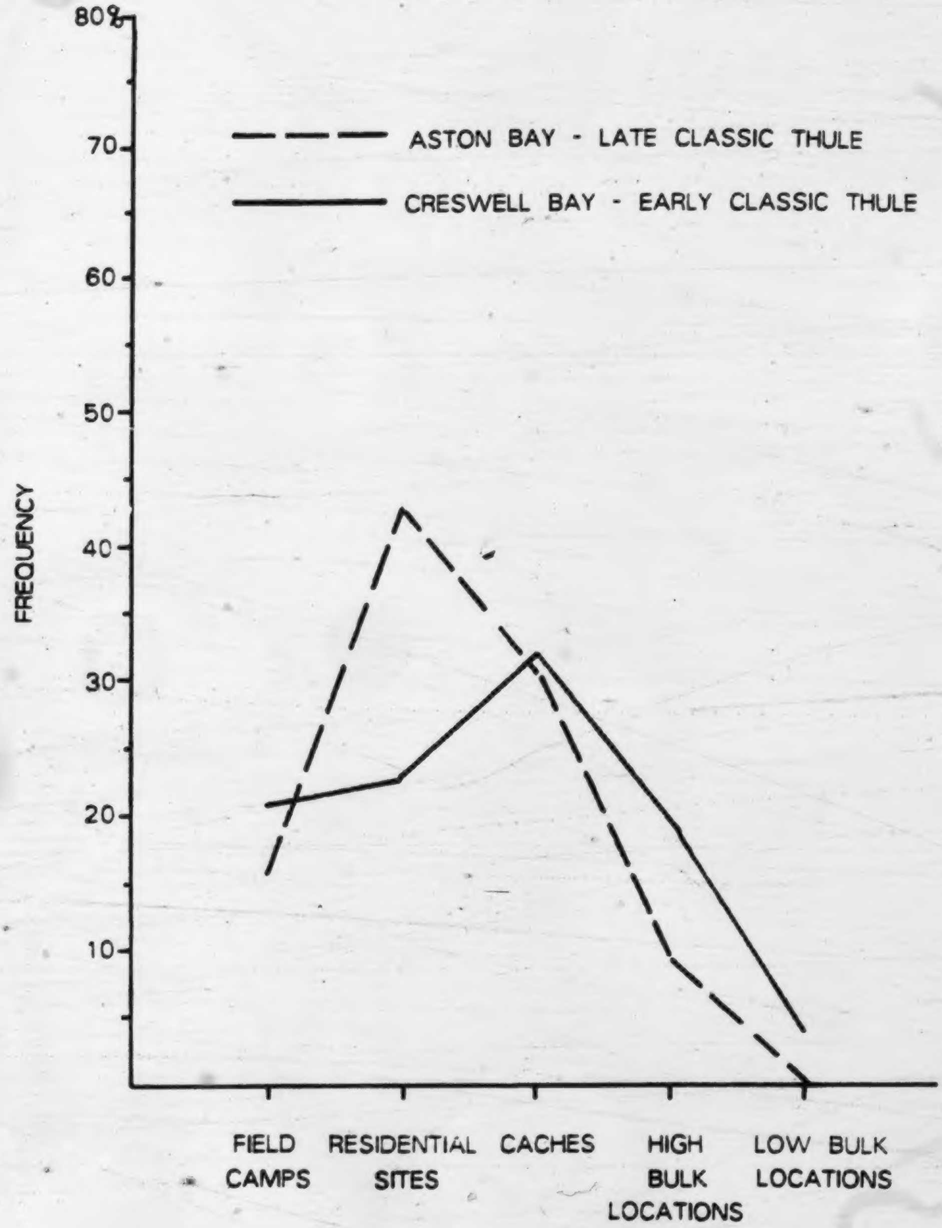


Figure 56. Comparison of early Classic Thule (Creswell Bay) and late Classic Thule (Aston Bay) site/component type frequencies in the Somerset Island area.

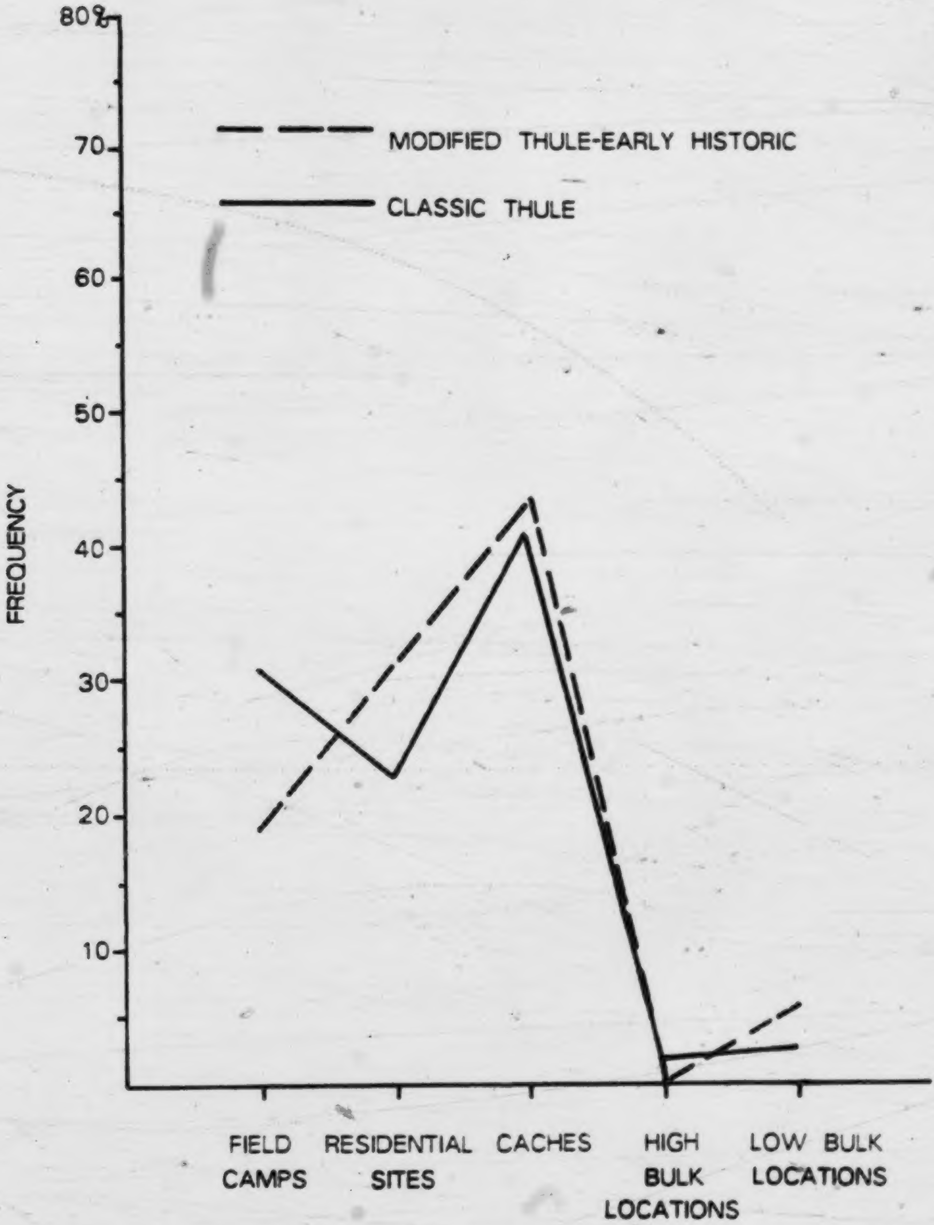


Figure 57. Comparison of Classic Thule and Modified Thule-early Historic site/component type frequencies in the King William Island-Adelaide Peninsula area.

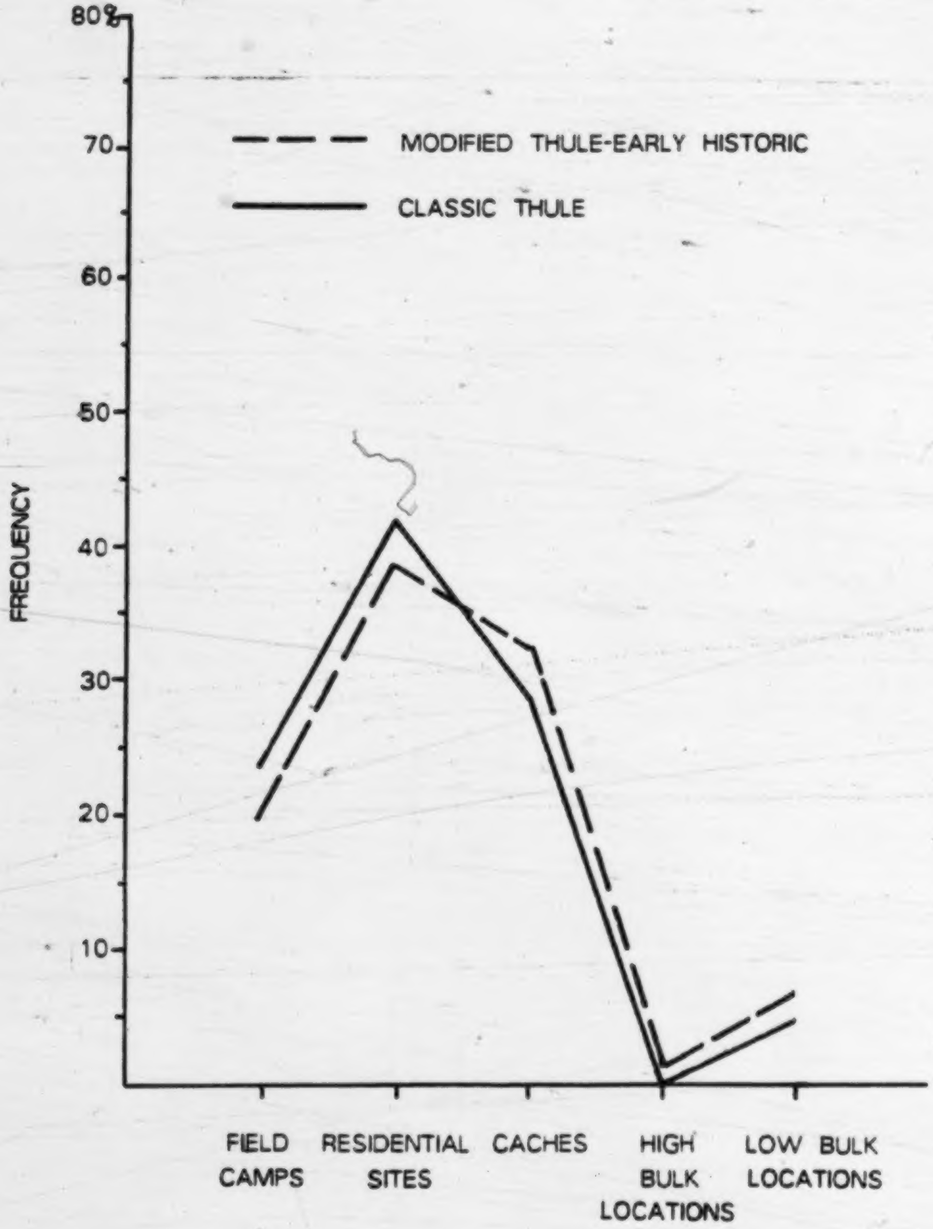


Figure 58. Comparison of Classic Thule and Modified Thule-early Historic site/component type frequencies in the Lord Mayor Bay-Netsilik Lake area.

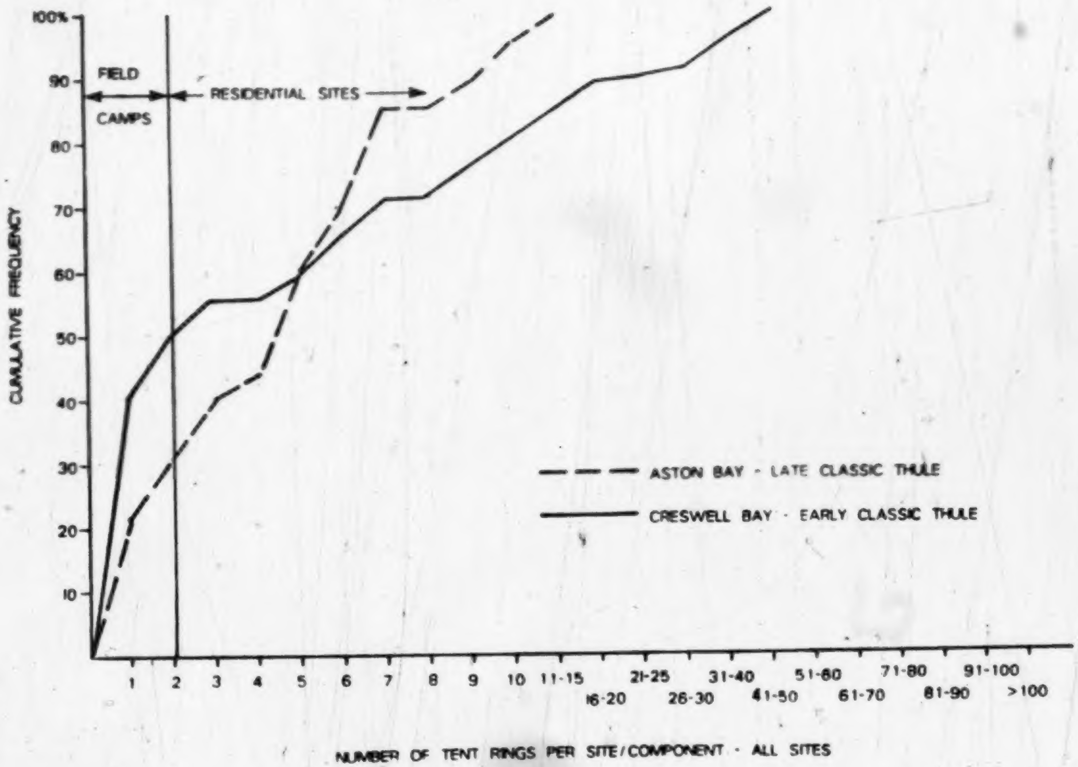


Figure 59. Comparison of early Classic Thule (Creswell Bay) and late Classic Thule (Aston Bay) tent ring site/component frequencies according to site/component size in the Somerset Island area.

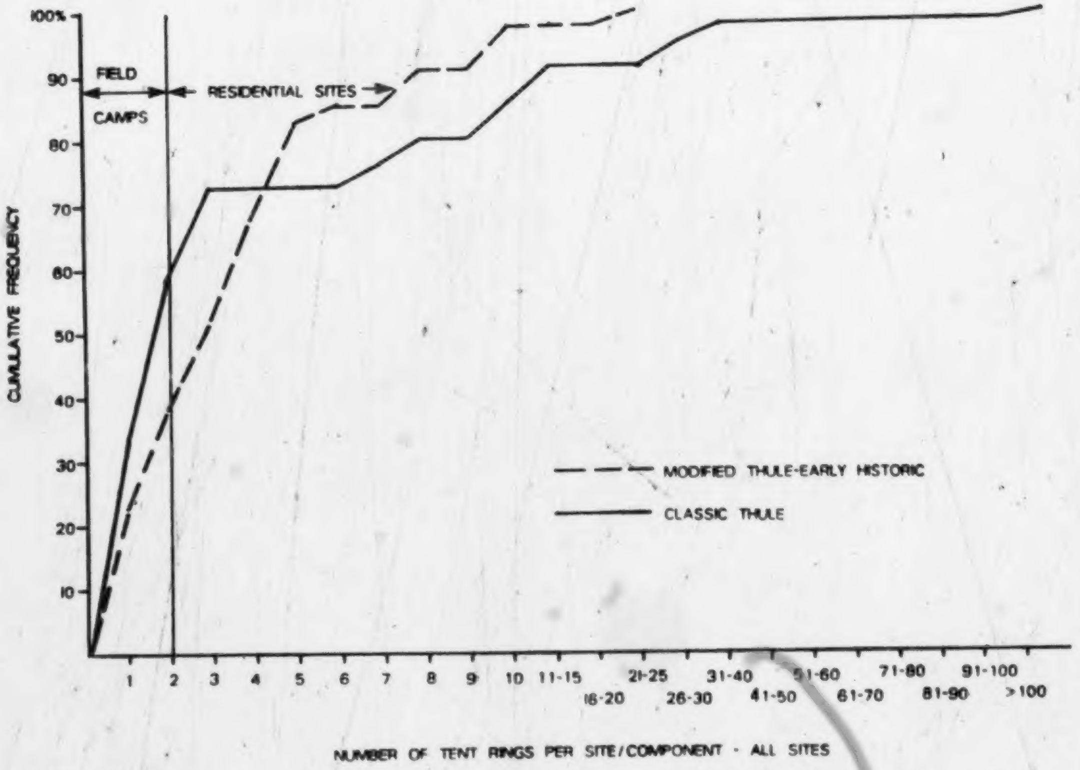


Figure 60. Comparison of Classic Thule and Modified Thule-early Historic tent ring site/component frequencies according to site/component size in the King William Island-Adelaide Peninsula area.

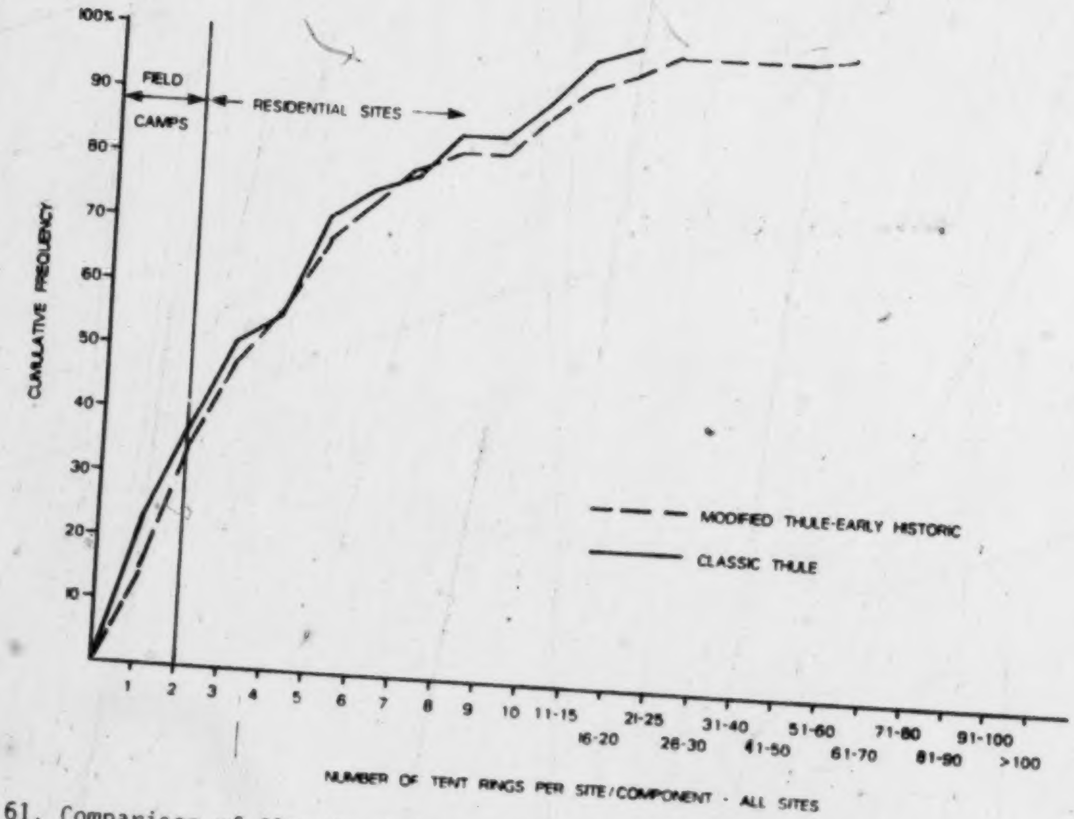


Figure 61. Comparison of Classic Thule and Modified Thule-early Historic tent ring site/component frequencies according to site/component size in the Lord Mayor Bay-Netsilik Lake area.

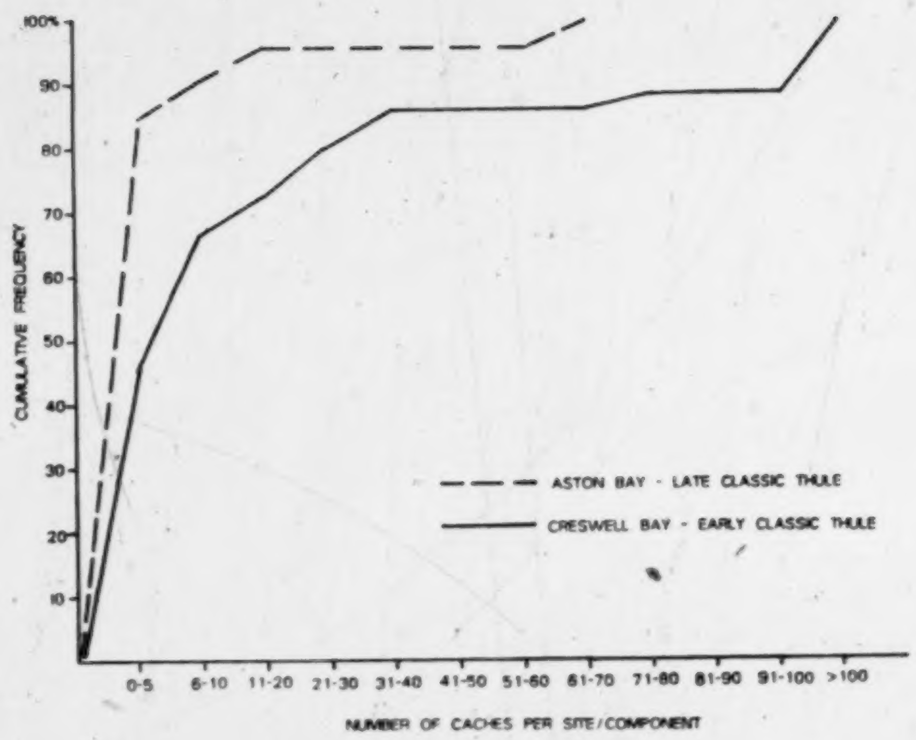


Figure 62. Comparison of early Classic Thule (Creswell Bay) and late Classic Thule (Aston Bay) cache site/component frequencies according to site/component size in the Somerset Island area.

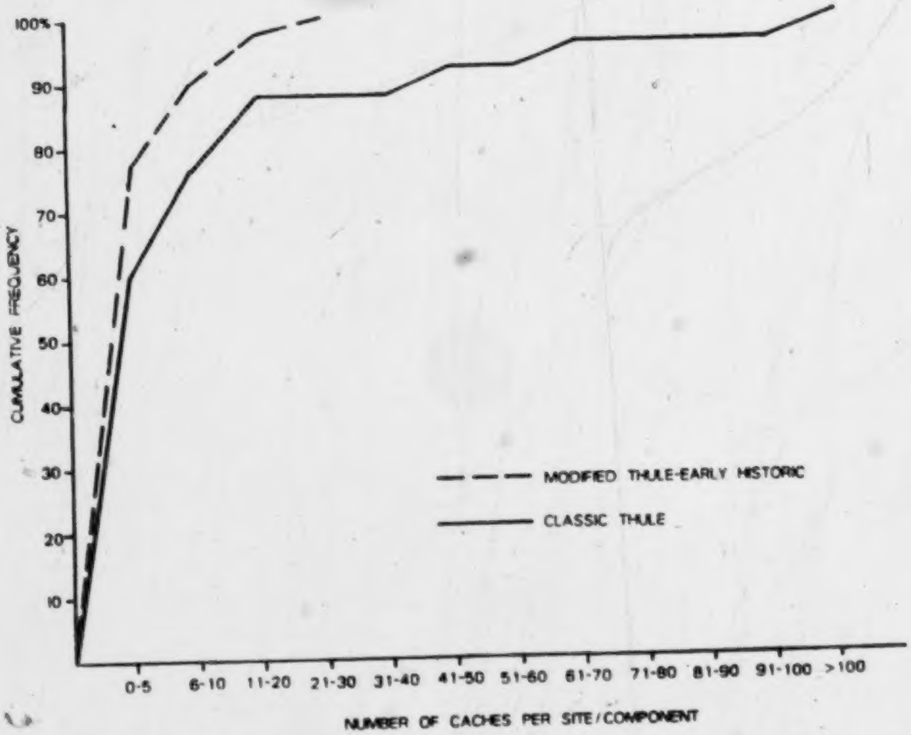


Figure 63. Comparison of Classic Thule and Modified Thule-early Historic cache site/component frequencies according to cache site/component size in the King William Island-Adelaide Peninsula area.

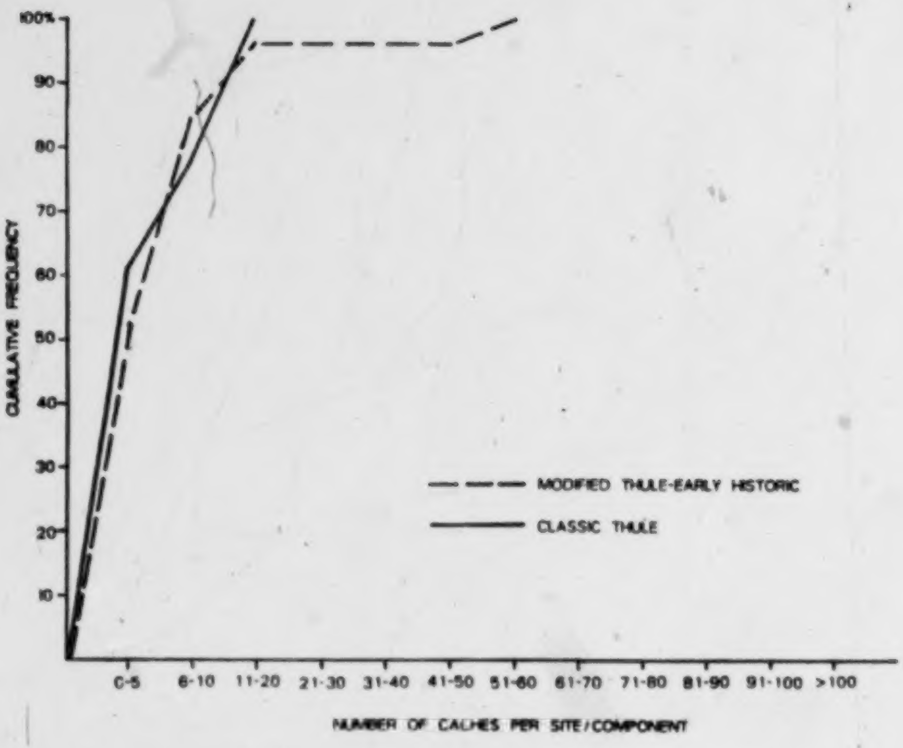


Figure 64. Comparison of Classic Thule and Modified Thule-early Historic cache site/component frequencies according to cache site/component size in the Lord Mayor Bay-Netsilik Lake area.

Test Implication 2

"Intersite variability should be relatively high for Classic Thule sites and decrease for Modified Thule and early Historic sites."

Assuming, as previously discussed, that intersite variability is reflected by changes in cache/tent ring ratios with changes in site size, the predicted pattern for collectors (low ratios for smaller sites, high ratios for larger sites) are evident for both early and late Classic Thule occupations on Somerset Island (Figures 65). That is, smaller cache sites tend to be associated with proportionately small numbers of tent rings, while larger cache sites tend to be associated with proportionately larger tent ring sites. For the King William Island-Adelaide Peninsula region, the trend from a 'collecting' pattern to a 'foraging' pattern occurs as predicted (Figure 66). That is, the increasing cache/tent ring ratio with increasing tent ring site size (i.e. collecting pattern) is replaced by one in which there is essentially a constant cache/tent ring ratio regardless of the site size (i.e. foraging pattern). For the Lord Mayor Bay region, however, there is relatively little change in the ratio with increasing site size for both Classic Thule and Modified Thule-early Historic (Figure 67). Both patterns, in fact, exhibit generally decreasing ratios with increasing site size.

Test Implication 3

"Classic Thule site patterns should exhibit recognizable foraging

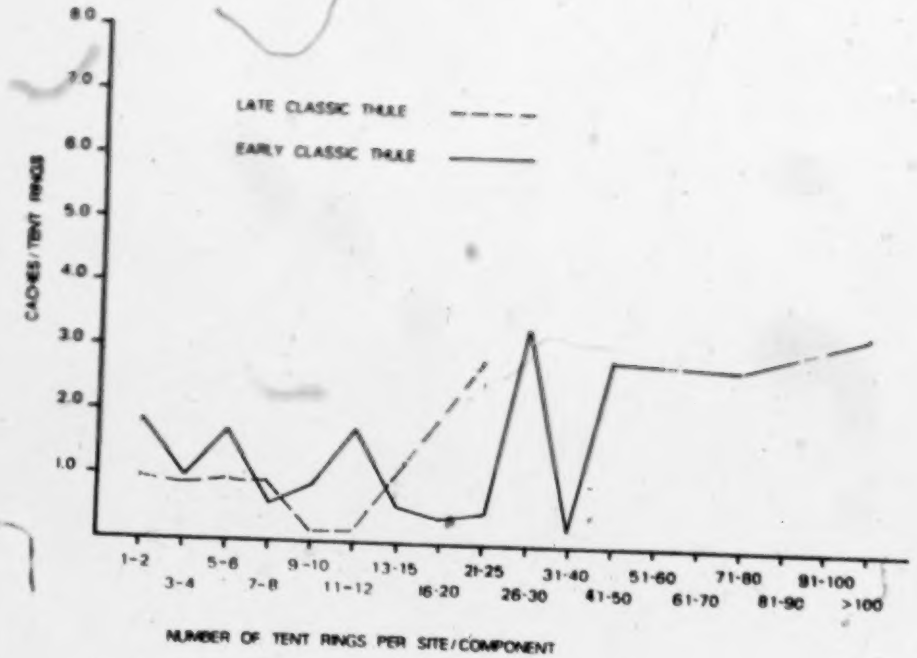


Figure 65. Comparison of average proportion of caches/tent rings according to tent ring site/component size for early Classic Thule (Creswell Bay) and late Classic Thule (Aston Bay) sites in the Somerset Island area. Only sites containing both feature types are included.

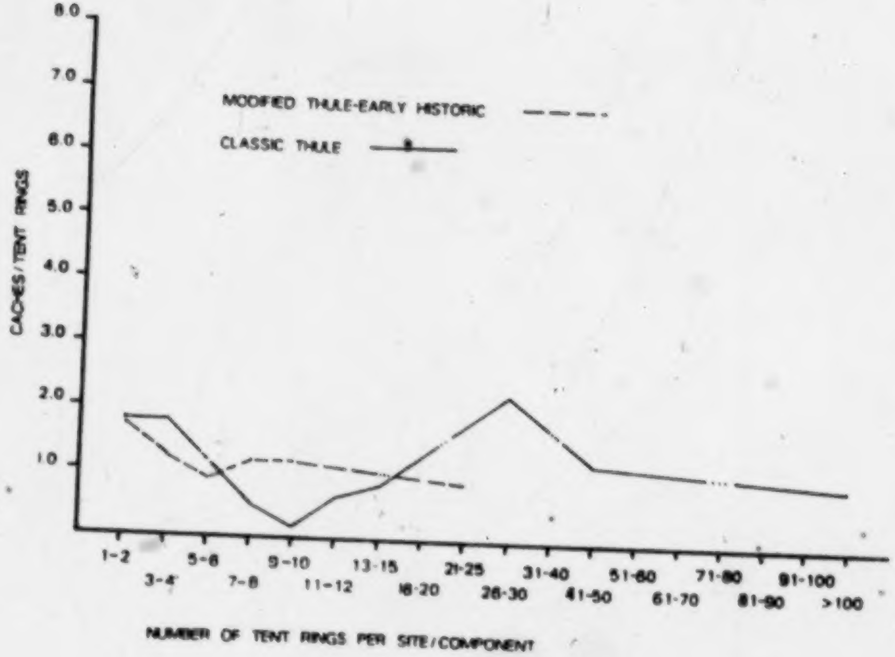


Figure 66. Comparison of average proportion of caches/tent rings according to tent ring site/component size for Classic Thule and Modified Thule-early Historic sites in the King William Island-Adelaide Peninsula area. Only sites containing both feature types are included.

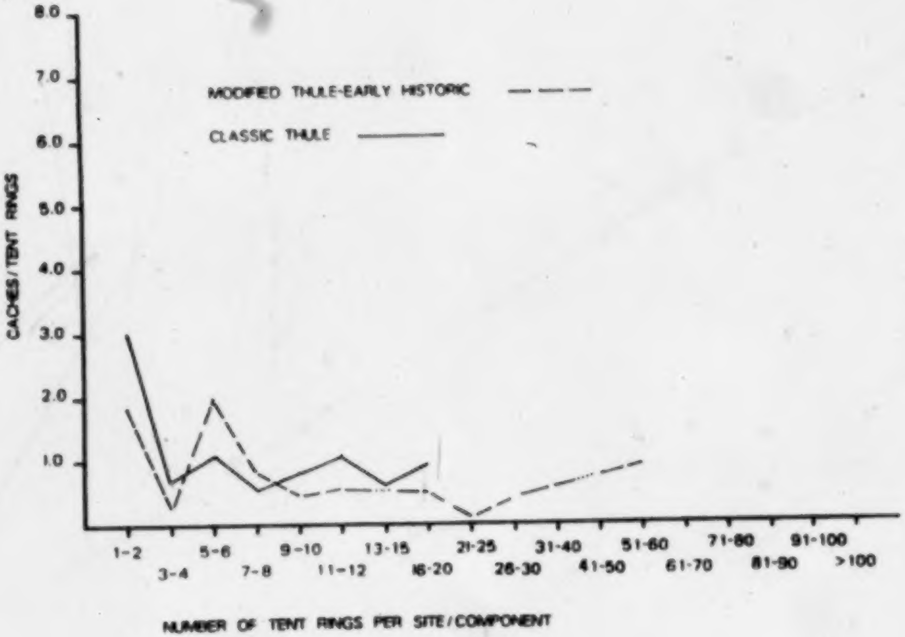


Figure 67. Comparison of average proportion of caches/tent rings according to tent ring site/component size for Classic Thule and Modified Thule-early Historic sites in the Lord Mayor Bay-Netsilik Lake area. Only sites containing both feature types are included.

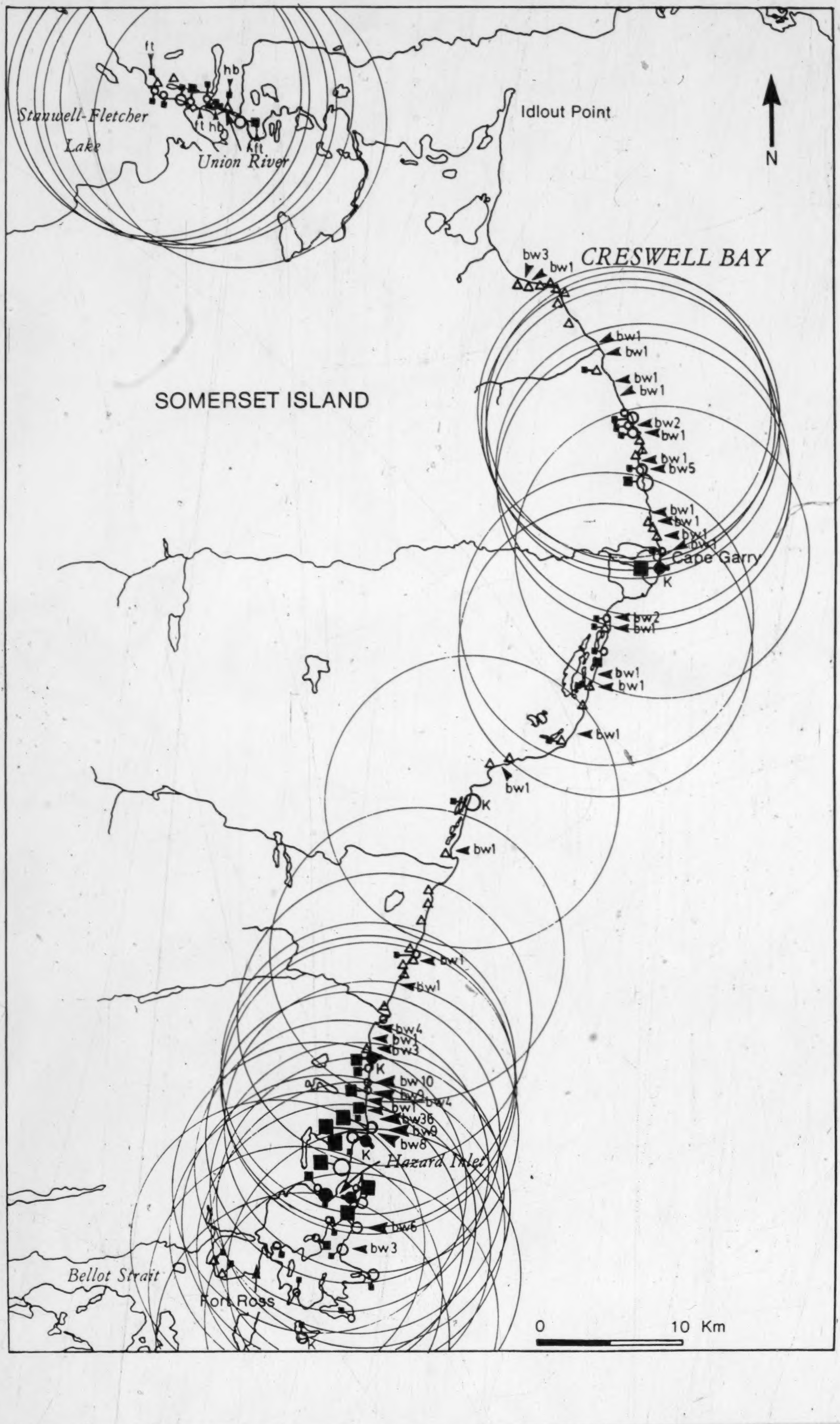
> and logistical zones, and the foraging zones (defined from residential bases) should be associated primarily with high-bulk locations and caches. Modified Thule and early Historic site patterns should exhibit fewer logistical zonations and instead approximate a continuous series of foraging zones."

As discussed previously, foraging zones can be defined by an approximately ten km radius from residential bases, while logistical zones can be defined by an approximately 15-20 km radius from residential bases. The following discussion will be limited primarily to those survey areas which incorporate at least one 20 km survey segment: Creswell Bay, Aston Bay, King William Island, and Lord Mayor Bay.

A trend from site patterns incorporating foraging and logistical radii to patterns incorporating primarily foraging radii is clearly evident in both the Somerset Island (Creswell Bay and Aston Bay) and King William Island regions (Figures 68-71). In the Creswell Bay area, although there is considerable overlap in foraging radii for spring-fall residential sites, the overlap is concentrated in two primary areas: immediately north of Cape Garry and near Hazard Inlet (Figure 68). Furthermore, the majority of field camps are located outside of these main foraging radii concentrations, but within logistical radii. In the Aston Bay area, on the other hand, the foraging radii are less polarized, more evenly dispersed, and for the most part overlapping (Figure 69).

In the King William Island area, there is a similar pattern change from Classic Thule to Modified Thule-early Historic. That is, Classic

Figure 68. Foraging zones associated with early Classic Thule tent ring residential sites, Creswell Bay, Somerset Island.


Stanwell-Fletcher
Lake
Union River
ft
hb
ft hb
ft
Idlout Point
N
CRESWELL BAY
bw3
bw1
bw1
bw1
bw1
bw1
bw2
bw1
bw1
bw5
bw1
bw1
bw1
bw1
Cape Garry
K
bw2
bw1
bw1
bw1
bw1
bw1
K
bw1
bw1
bw1
bw4
bw1
bw3
K
bw10
bw9
bw4
bw1
bw36
bw9
bw8
K
Hazard Inlet
bw6
bw3
SOMERSET ISLAND
Bellot Strait
Fort Ross
K
0
10 Km

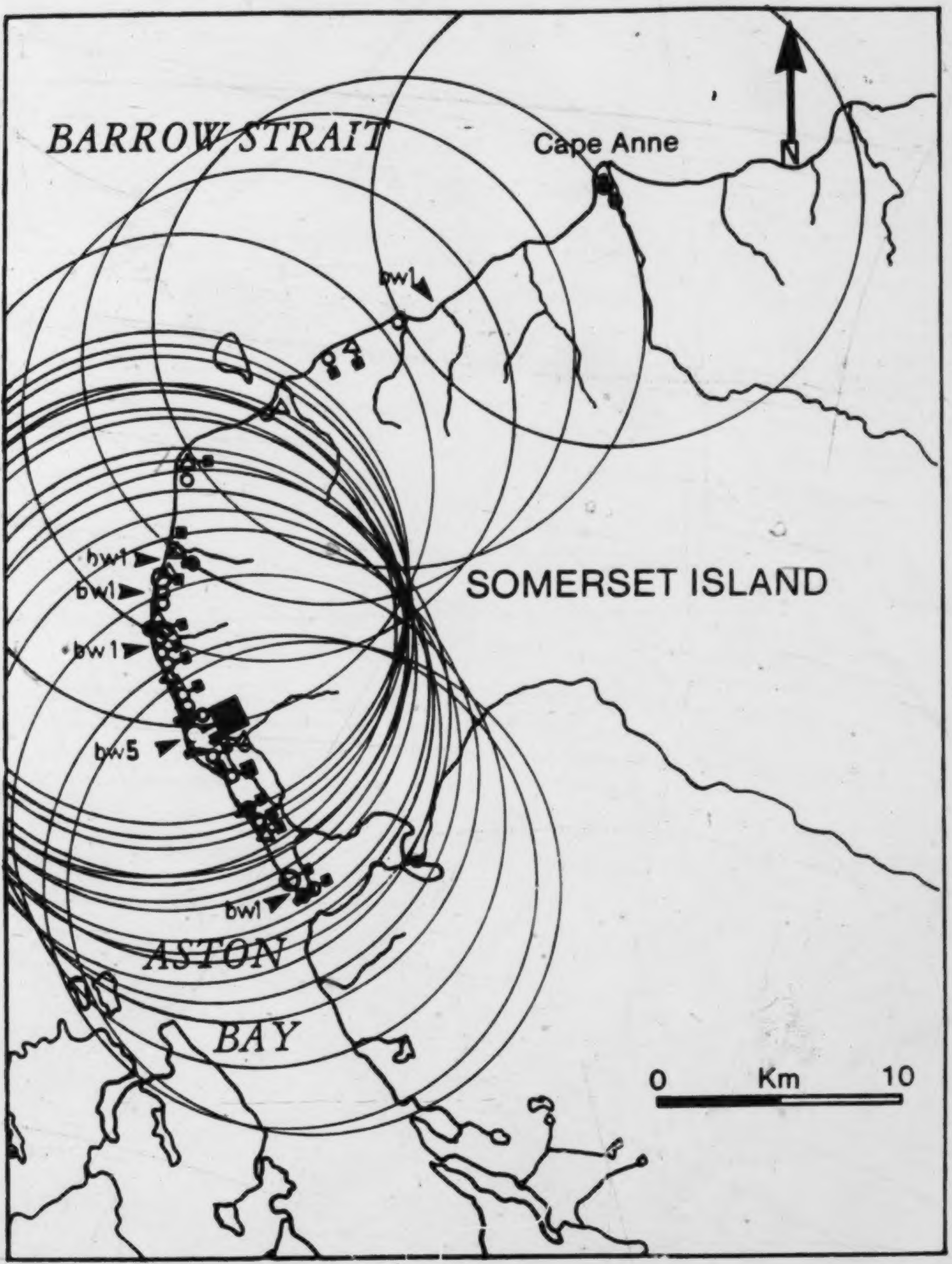

BARROW STRAIT
Cape Anne
bw1
bw1
bw1
bw1
bw5
bw1
SOMERSET ISLAND
ASTON
BAY
0
Km
10

Figure 69. Foraging zones associated with late Classic Thule tent ring residential sites, Aston Bay, Somerset Island.

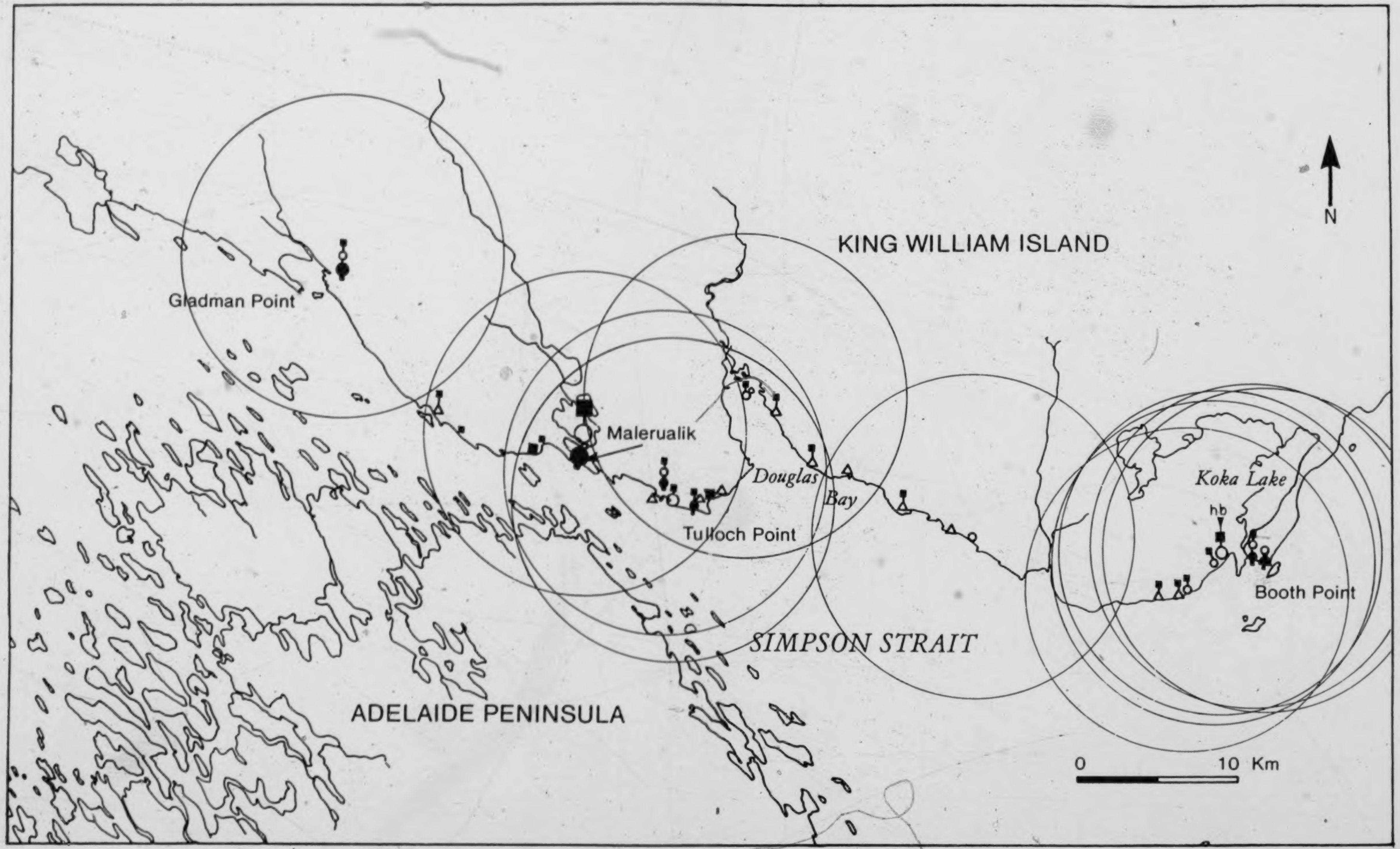

KING WILLIAM ISLAND
N
Gladman Point
Malerualik
Douglas Bay
Tulloch Point
Koka Lake
hb
Booth Point
SIMPSON STRAIT
ADELAIDE PENINSULA
0
10 Km

Figure 70. Foraging zones associated with Classic Thule tent ring residential sites, King William Island.

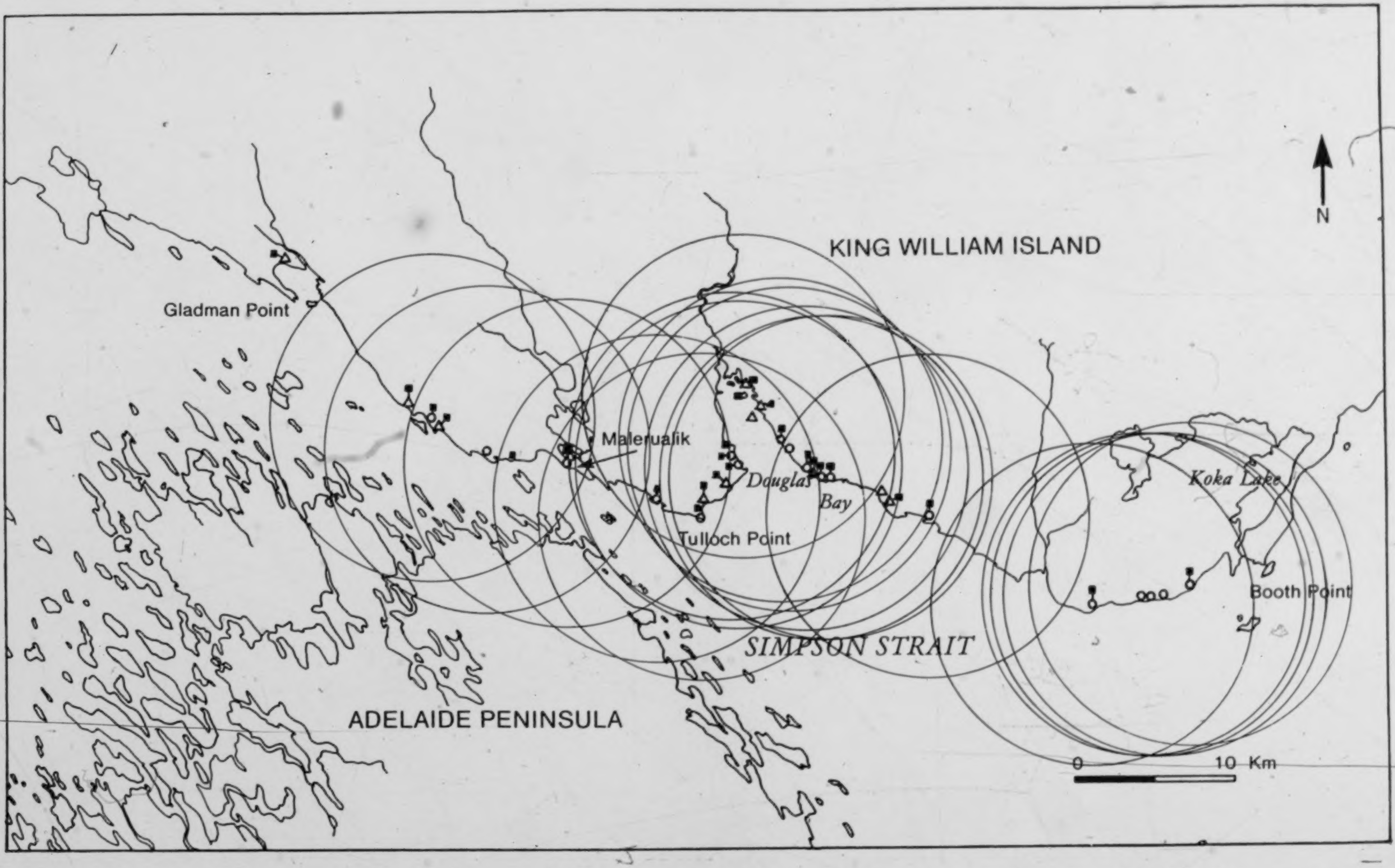

KING WILLIAM ISLAND
N
Gladman Point
Malerualik
Douglas
Bay
Tulloch Point
Koka Lake
Booth Point
SIMPSON STRAIT
ADELAIDE PENINSULA
0
10 Km

Figure 71. Foraging zones associated with Modified Thule-early Historic tent ring residential sites, King William Island.

Thule foraging radii associated with spring-fall residential sites exhibit comparatively little continuous overlap, but instead are concentrated in two areas: the narrows of Simpson Strait and at Booth Point (Figure 70). By contrast, the Modified Thule-early Historic pattern is less concentrated, and exhibits almost continuous overlap (Figure 71).

In the Lord Mayor Bay area, the trend is very weakly developed, with both Classic Thule and Modified Thule-early Historic residential sites concentrated at Sagvak Inlet and near Felix Harbour, and the latter only slightly more dispersed throughout the intervening coastline (Figures 72 and 73).

While the spring-fall residential site patterns, at least on Somerset Island and King William Island-Adelaide Peninsula, support the collecting-foraging transition, certainly the most striking patterns are those associated with the Classic Thule winter residential sites. In the Creswell Bay region, major semisubterranean dwelling sites are concentrated in three regions: Hazard Inlet and Cape Garry (this study), and along the north coast of Creswell Bay immediately north of Idlout Point (McCartney 1979a; Taylor and McGhee 1979). Each of the three centers is separated by almost exactly two logistical radii (Figure 74). Furthermore, all major cache and high-bulk locations lie within the foraging radii of the two centers surveyed (Hazard Inlet and Cape Garry), and on the basis of large cache sites and high-bulk locations identified by Clarke (1979), and McCartney (1980), a similar situation apparently obtains on the north coast of Creswell Bay.

Significantly, the only large spring-fall residential site between

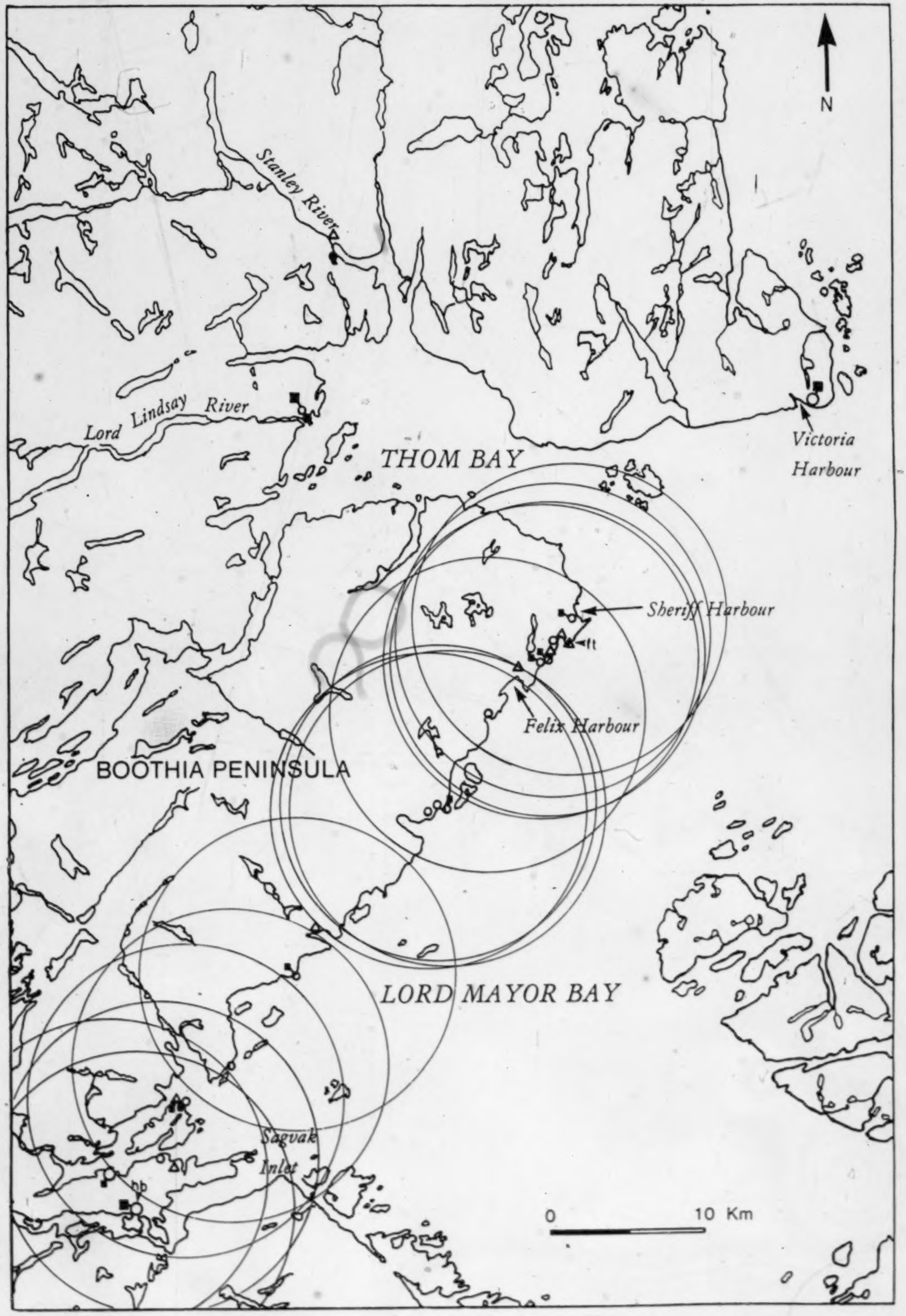

N
Stanley River
Lord Lindsay River
THOM BAY
Victoria Harbour
Sheriff Harbour
lt
Felix Harbour
BOOTHIA PENINSULA
LORD MAYOR BAY
Sagvak Inlet
hb
0
10 Km

Figure 72. Foraging zones associated with Classic Thule tent ring residential sites, Lord Mayor Bay.

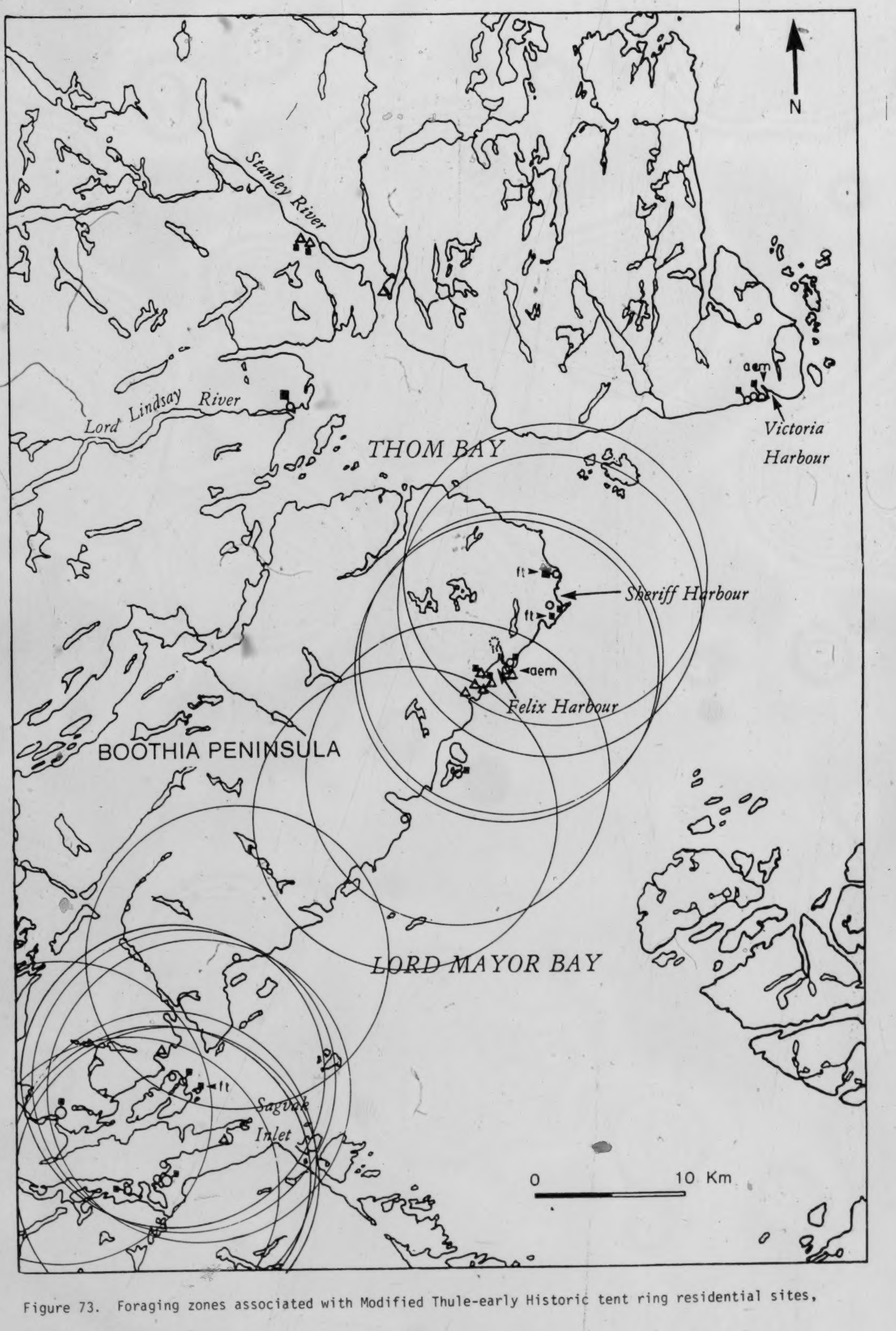

N
Stanley River
Lord Lindsay River
THOM BAY
Victoria Harbour
aem
Sheriff Harbour
ft
ft
aem
Felix Harbour
BOOTHIA PENINSULA
LORD MAYOR BAY
ft
Sagvak Inlet
0
10 Km

Figure 73. Foraging zones associated with Modified Thule-early Historic tent ring residential sites, Lord Mayor Bay.

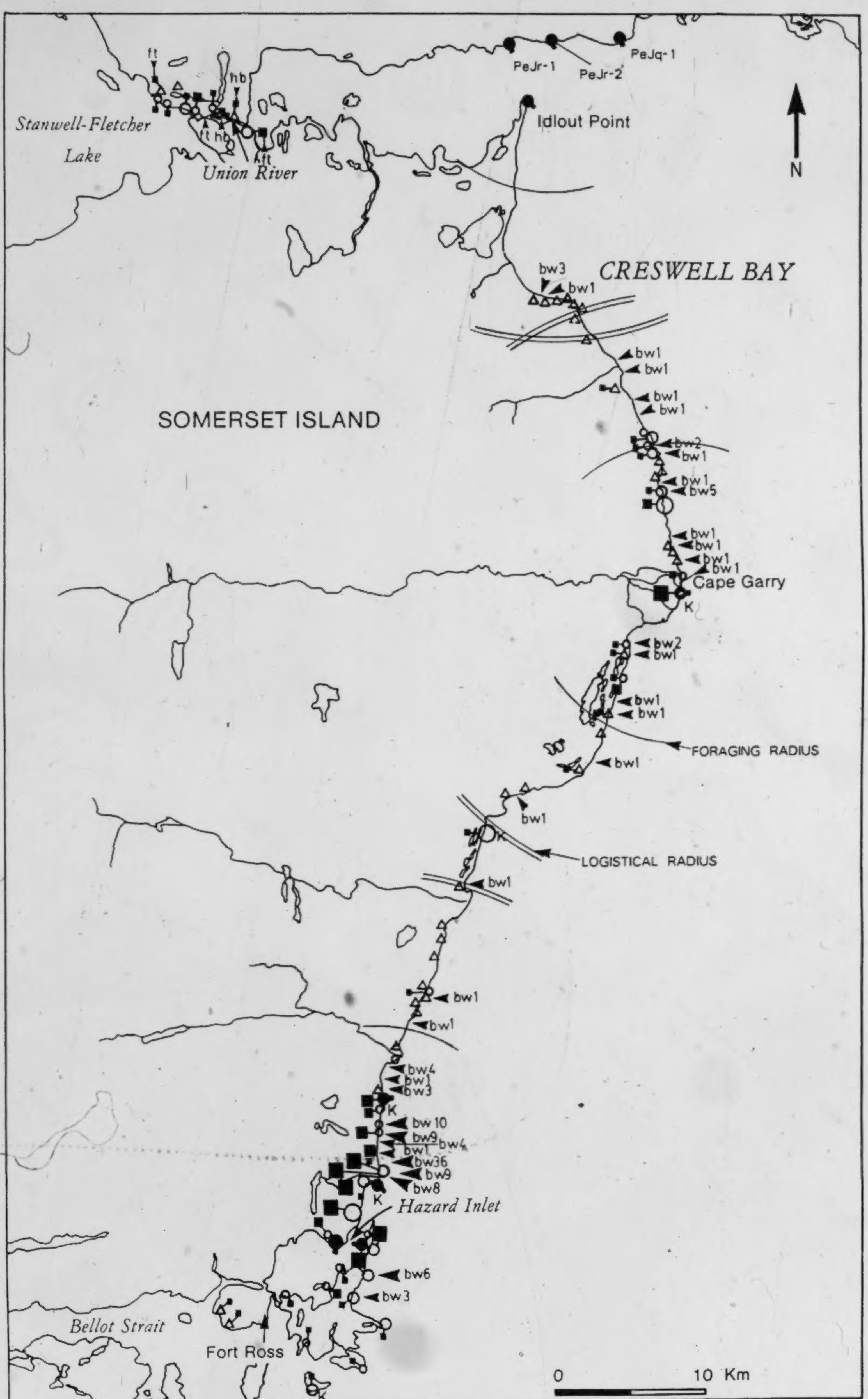

PeJr-1
PeJr-2
PeJq-1
Idlout Point
N
Stanwell-Fletcher
Lake
Union River
ft
hb
CRESWELL BAY
SOMERSET ISLAND
bw3
bw1
bw2
bw5
bw4
bw10
bw9
bw36
bw8
bw6
Cape Garry
K
FORAGING RADIUS
LOGISTICAL RADIUS
Hazard Inlet
Bellot Strait
Fort Ross
0
10 Km

Figure 74. Foraging and logistical zones: semisubterranean dwelling sites, Creswell Bay.

the major centers of Cape Garry and Hazard Inlet lies at the approximate point of intersection of their respective logistical radii, and contains in addition to the 43 tent rings two large features interpreted as karigi.

The pattern for the late Classic winter residential sites at Aston Bay, although exhibiting a separation of residential centers along the Aston Bay coast proper and Cape Anne, nevertheless do not incorporate well defined logistical zones (Figure 75). Instead, the winter residential sites are more closely spaced, primarily within overlapping foraging zones. Significantly, the largest high-bulk location and largest cache site occur together at one site exactly one foraging radius from each of the two extremes of the five winter residential sites in Aston Bay proper, and almost all other cache and high-bulk locations occur within the foraging radii of the respective sites.

In the King William Island area, the pattern for Classic Thule is similar to that for Creswell Bay in that winter residential sites are well defined logistical zones (Figure 75). Instead, the winter residential sites are more closely spaced, primarily within overlapping foraging zones. Significantly, the largest high-bulk location and largest cache site occur together at one site exactly one foraging radius from each of the two extremes of the five winter residential sites in Aston Bay proper, and almost all other cache and high-bulk locations occur within the foraging radii of the respective sites.

In the King William Island area, the pattern for Classic Thule is similar to that for Creswell Bay in that winter residential sites are

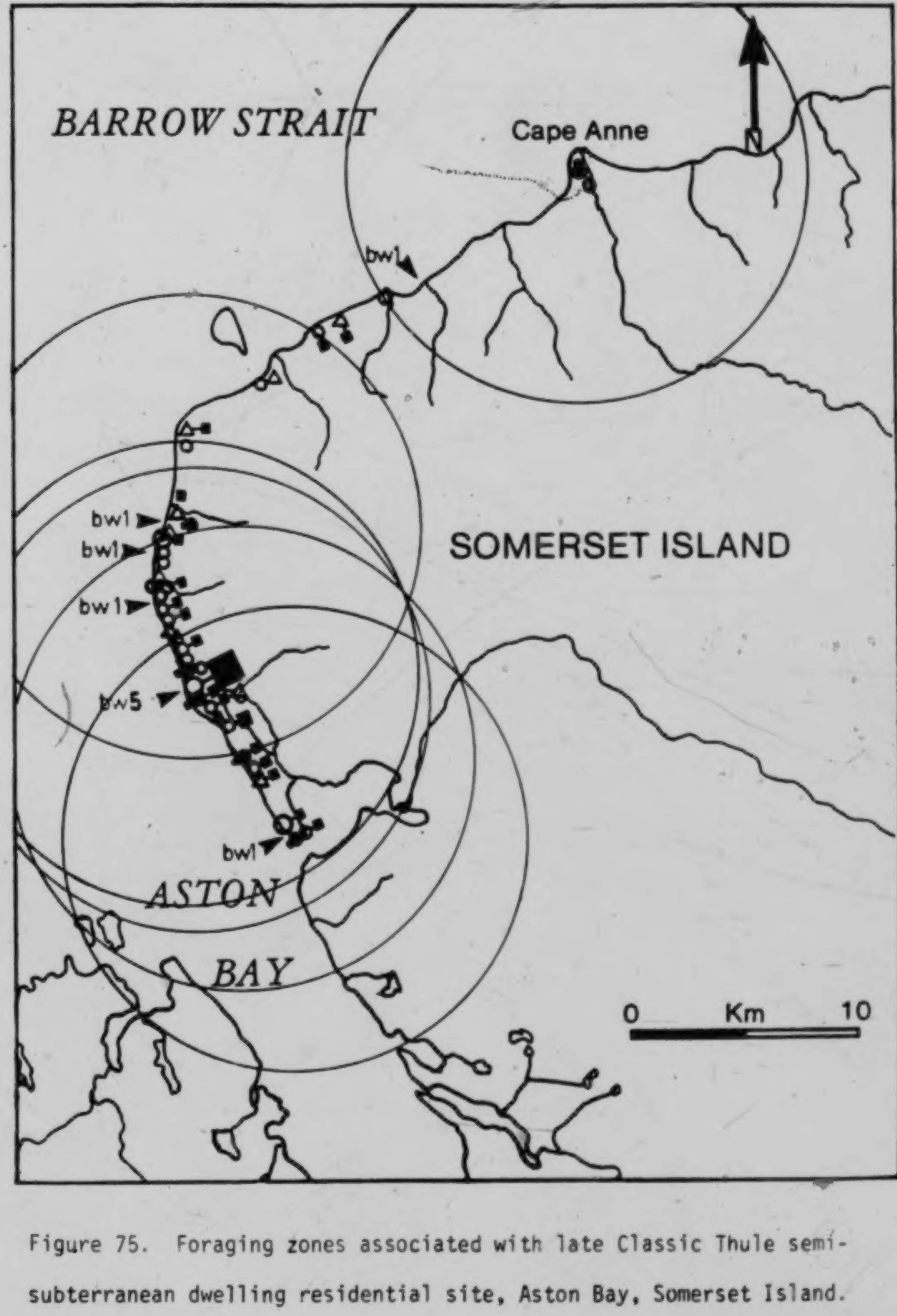

BARROW STRAIT
Cape Anne
N
bw1
bw1
bw1
bw1
bw5
bw1
SOMERSET ISLAND
ASTON
BAY
0
Km
10

Figure 75. Foraging zones associated with late Classic Thule semi-subterranean dwelling residential site, Aston Bay, Somerset Island.

likewise concentrated at three centers (Gladman Point, the narrows of Simpson Strait, and Booth Point), none of which are within the foraging radii of the other two (Figure 76). Furthermore, the largest two of the three centers (Simpson Strait narrows, Booth Point) are separated by almost exactly two logistical radii. Finally, all major cache and caribou crossing locations are within the foraging radii of the respective centers.

In the Lord Mayor Bay-Netsilik Lake and Sherman Inlet areas, none of the Thule winter sites were incorporated within 20 km survey segments. However, those that were recorded in those areas were not concentrated in centers but nevertheless occurred within foraging radii of the primary caribou crossing and/or cache localities (see Figures 77-79).

Only one winter residential site associated with the Modified Thule-early Historic in the southern study area was recorded, this being a group of three snow dwelling scatters at Felix Harbour in Lord Mayor Bay, and therefore direct comparison with Classic Thule winter residential patterns is not possible. However, expected patterns can be obtained from the examination of locations of early Historic winter residential sites as observed by 19th century explorers. For the study area, Ross' (1835) descriptions of Netsilik movements in Lord Mayor Bay in the winter and spring of 1830 are the most detailed, and the approximate locations of the various camps are represented in Figure 80. All locations represent sealing camps, and the foraging as opposed to collecting pattern is readily evident.

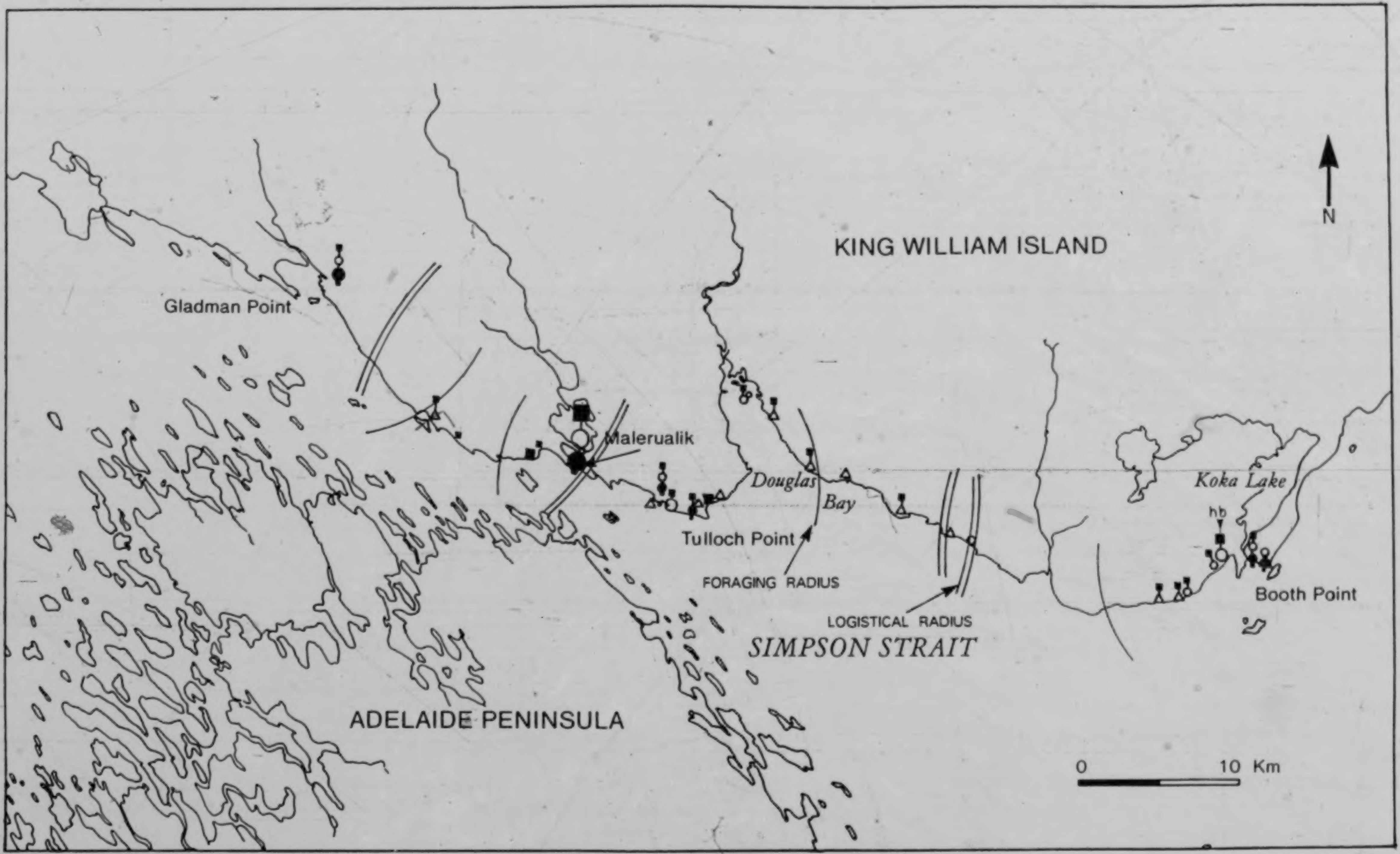

KING WILLIAM ISLAND
N
Gladman Point
Malerualik
Douglas
Bay
Tulloch Point
FORAGING RADIUS
LOGISTICAL RADIUS
SIMPSON STRAIT
Koka Lake
hb
Booth Point
ADELAIDE PENINSULA
0
10 Km

Figure 76. Foraging and logistical zones associated with Classic Thule semisubterranean dwelling residential sites, King William Island.

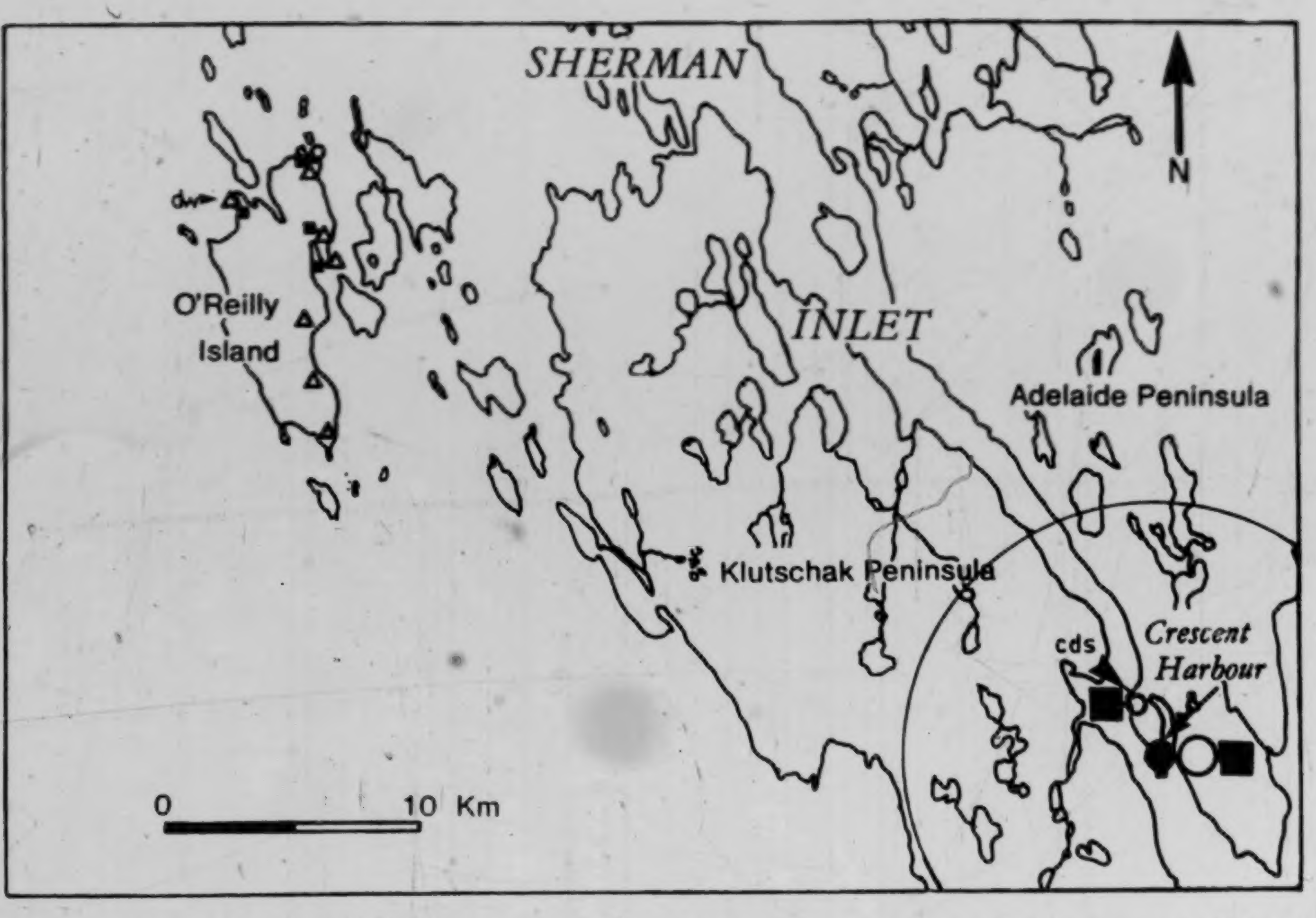

SHERMAN
INLET
N
dw
O'Reilly Island
Adelaide Peninsula
Klutschak Peninsula
cds
Crescent Harbour
0
10 Km

Figure 77. Foraging zones associated with Classic Thule residential semisubterranean dwelling sites, Sherman Inlet.

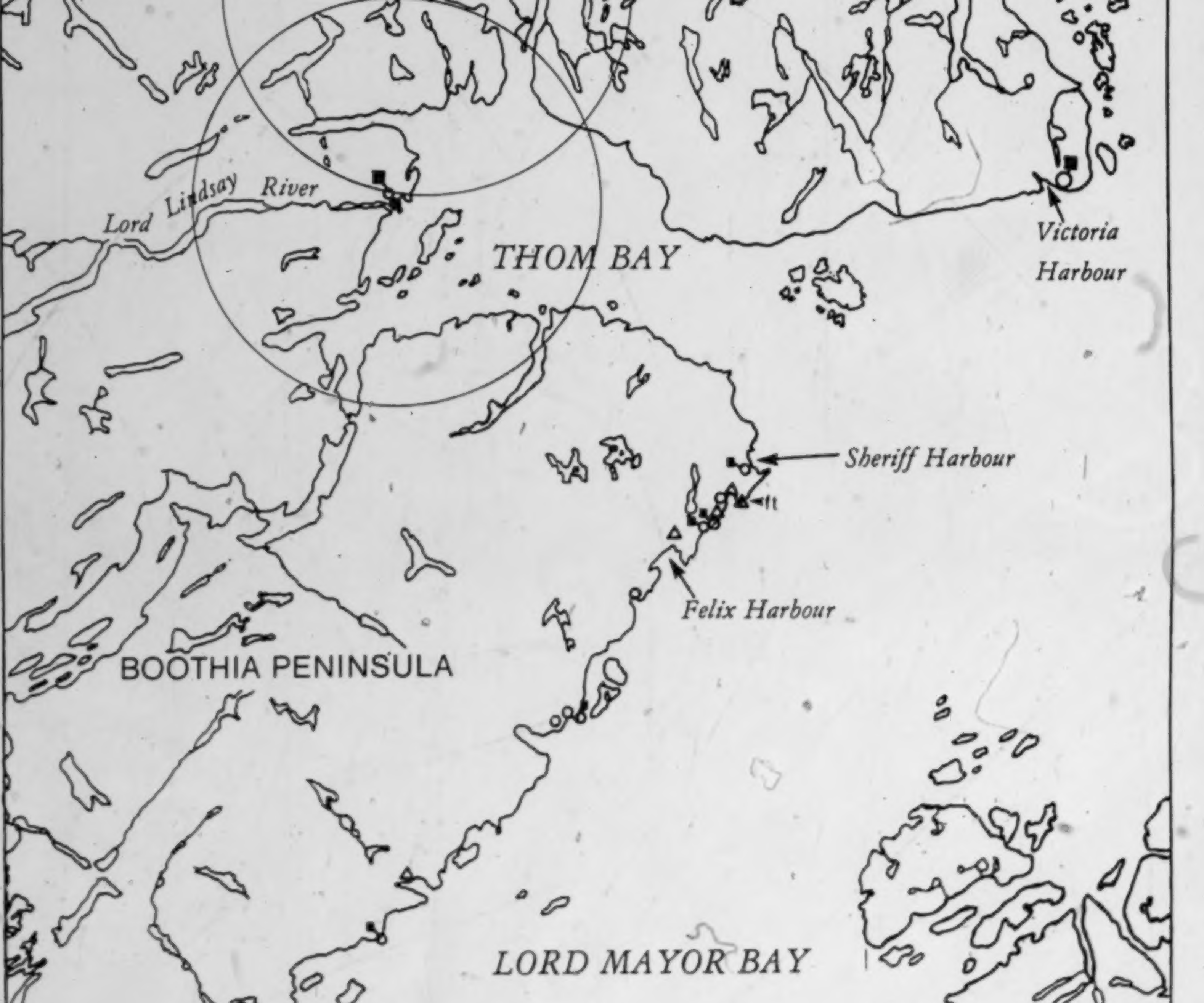

N
Stanley River
Lord Lindsay River
THOM BAY
Victoria Harbour
Sheriff Harbour
lt
Felix Harbour
BOOTHIA PENINSULA
LORD MAYOR BAY
Sagvak Inlet
hb
0
10 Km

Figure 78. Foraging zones associated with Classic Thule semisubterranean dwelling sites, Lord Mayor Bay.

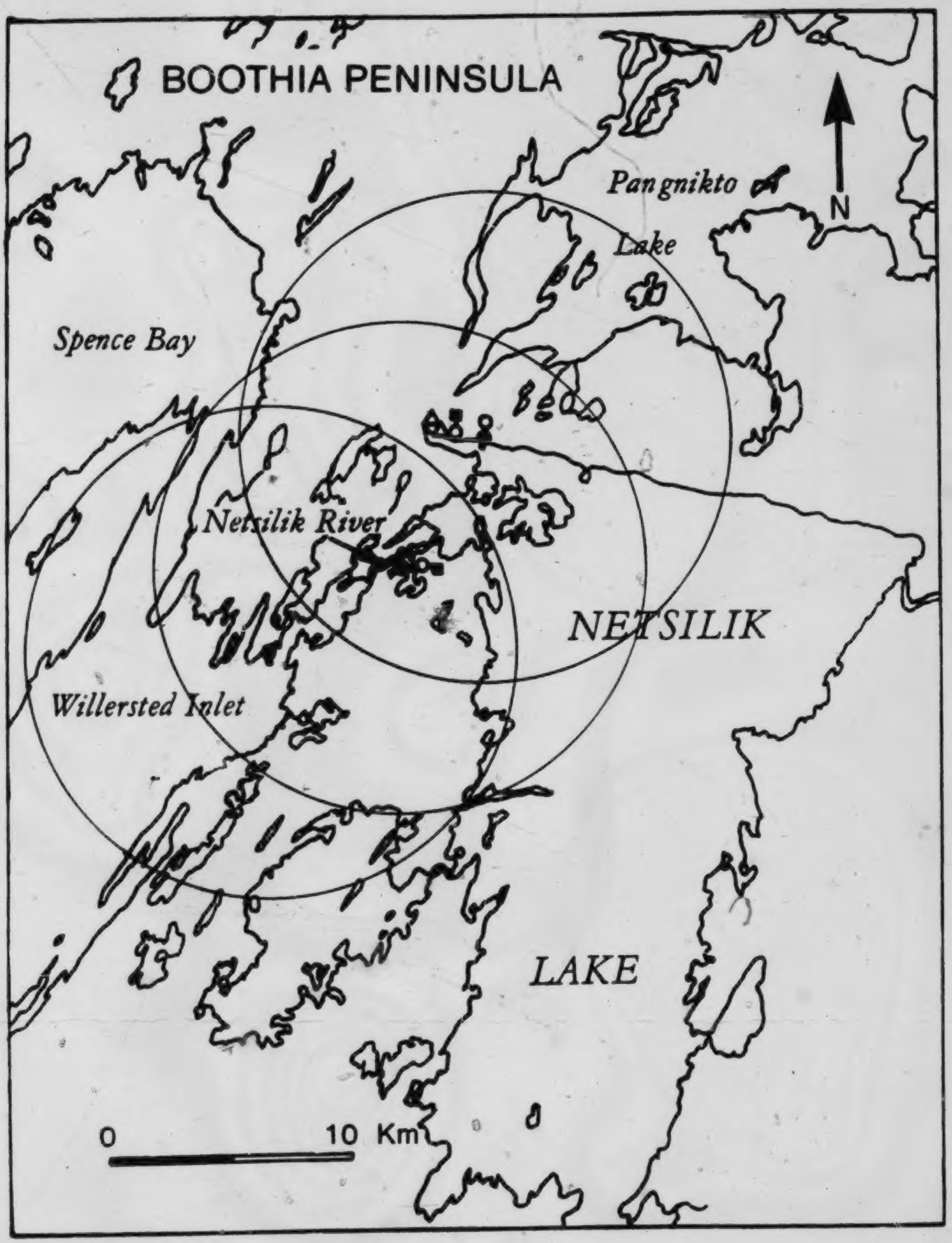

BOOTHIA PENINSULA
Pangnikto
Lake
N
Spence Bay
Netsilik River
NETSILIK
Willersted Inlet
LAKE
0
10 Km

Figure 79. Foraging zones associated with Classic Thule semisubterranean dwelling sites, Netsilik Lake.

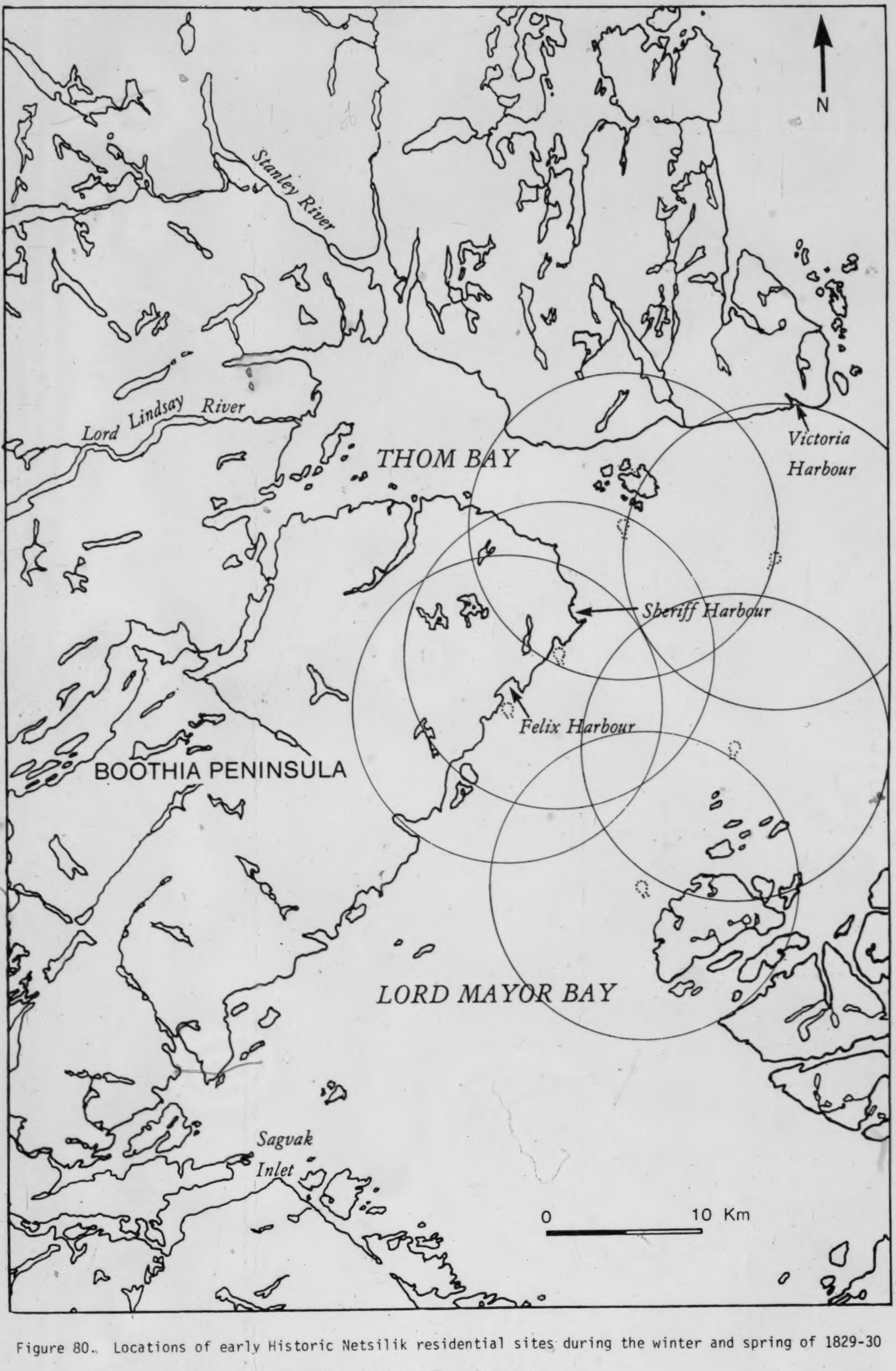

N
Stanley River
Lord Lindsay River
THOM BAY
Victoria Harbour
Sheriff Harbour
Felix Harbour
BOOTHIA PENINSULA
LORD MAYOR BAY
Sagvak Inlet
0
10 Km

Figure 80. Locations of early Historic Netsilik residential sites during the winter and spring of 1829-30 as described by Ross 1835:243-375, with associated foraging zones.

Test Implication 4

> "Classic Thule site placement patterns should emphasize, and be related to, bowhead whale procurement locations in the north and caribou procurement locations in the south, and secondarily to other "critical" resources in the respective areas. Later site placement patterns should tend to emphasize, and be related to, secondary resources."

In the northern regions, the presence of Classic Thule high-bulk bowhead whale caching and processing locations and large winter and spring-fall residential sites in the whaling "corridor" as defined by ice patterns and lack of major sites in other areas strongly supports the whaling emphasis (see also McCartney and Savelle 1983). A trend toward site placement patterns related to secondary resources is seen in the relatively dramatic shift in primary Thule occupation from Creswell Bay to Aston Bay by the late Classic Thule period. Only one late Classic Thule site occurs in the Creswell Bay area, that being PeJr-2 on the north coast of the bay (McCartney 1979a; Taylor and McGhee 1979 - see also Figure 74). In addition, a second qarmang site has been recorded at the head of Nudlukta Inlet, immediately south of the Creswell Bay survey area (Schledermann 1978; personal observation 1977). Both are situated in the vicinity of major polynyas (Smith and Rigby 1981; Wenzel 1979) and to the two major anadromous fish localities in the region (McCart and Beste 1979).

In the southern study region, the shift to secondary resources is most evident in the King William Island area. Early Classic Thule winter residential sites are located only at the major caribou crossing locations (the narrows of Simpson Strait and Crescent Harbour (see Figures 44 and 47). Late Classic Thule sites, on the other hand, at least in the southern King William Island area, while still located at the major caribou crossings, are more dispersed and closer to secondary resources such as seals and anadromous fish (Figure 45). Finally, Modified Thule and early Historic spring-fall residential sites, while occurring at primary caribou crossings, show a more substantial concentration adjacent to sealing localities (e.g. Douglas Bay). Recorded early Historic winter residential sites were concentrated on the sea ice at the primary sealing localities immediately west of Booth Point and at the entrance to Sherman Inlet (McClintock 1859; Amundsen 1908; Stackpole 1965).

In the Lord Mayor Bay area, there is little difference between the placement of Classic Thule and Modified Thule-early Historic spring-fall residential sites, most being concentrated in the inner part of the bay and near Felix Harbour (Figures 40 and 51). In the Netsilik Lake region, there is again little difference (Figures 53-54). Winter residential site placement, however, does differ. Although Classic Thule sites occur, as anticipated, at the caribou crossing in the Netsilik Lake area (Figure 53), all relate to late Classic Thule occupations. The only early Classic winter residential site occurs in the northern Thom Bay area, adjacent to sealing and anadromous fish locations (Figure 50). The only winter residential site associated with the Modified Thule-early Historic phase consists of the remains of three snow dwellings at Felix Harbour, and, from the nature of the associated artifacts, appears to have been directly associated with metal procurement from the remains of the Victory's engine (see Plate 11b). Documented early Historic Netsilik winter residential sites in the area were located in major sealing areas in the northern part of Lord Mayor Bay and in Spence Bay, and, at least occasionally, near Netsilik Lake (see e.g. Ross 1835).

Test Implication 5

> "Classic Thule residential sites should be relatively permanent or semi-permanent, and should be associated with high-bulk locations. Modified Thule and early Historic residential sites, on the other hand, should be of a more temporary nature and show less association with high-bulk cache sites and/or high bulk locations."

Permanent or semi-permanent semisubterranean dwelling features recorded in the survey areas were restricted to Classic Thule occupations. Furthermore, as noted previously, the deeper, more heavily constructed forms that were excavated by McCartney (1979a) and Taylor and McGhee (1979) on Somerset Island, and by Rasmussen on King William Island (Mathiassen 1927a), and the two excavated during the present study (at sites 81-80, 82-12), have been demonstrated to be of early Classic Thule affiliation, while the two shallow, relatively lightly constructed semisubterranean dwellings excavated (sites 81-61, 82-17), and two others tested (sites 81-52, 81-73), have been demonstrated to be of late Classic affiliation, supporting the suggested trend toward less permanent settlements toward the end of the Classic Thule period. Other Classic Thule dwelling features recorded were restricted to tent rings, characteristic of temporary spring-fall occupations.

Also as discussed previously, no Modified Thule or early Historic sites containing features that could be classified as representative of permanent or semipermanent occupations were recorded during the surveys. All dwelling features recorded were tent rings, and at one site (Felix Harbour) snow dwelling features. Within the "tent ring" category, however, several sites contained relatively heavily constructed forms, occasionally with two or three courses of wall stones, suggesting considerable permanency compared to more lightly constructed tent rings (see Figure 81). These structures were recorded at both caribou crossing locations in the Netsilik Lake survey region, suggesting relatively extended occupations at these locations, but not apparently approaching those associated with semisubterranean dwellings.

The very close association of high-bulk locations and caches with Classic Thule winter residential sites has been previously briefly discussed in connection with foraging radii. This association is perhaps better illustrated in comparing the size of Classic Thule winter residential sites with the number of caches within an arbitrary two km radius (since it is unlikely residential sites would be placed at the extreme foraging range) (Figure 82). The association is strongest for early Classic Thule and decreases for late Classic Thule. Since early Historic winter residential sites tended to be located on the sea ice generally away from the major land-based cache sites, it is apparent that the decreasing association continued into

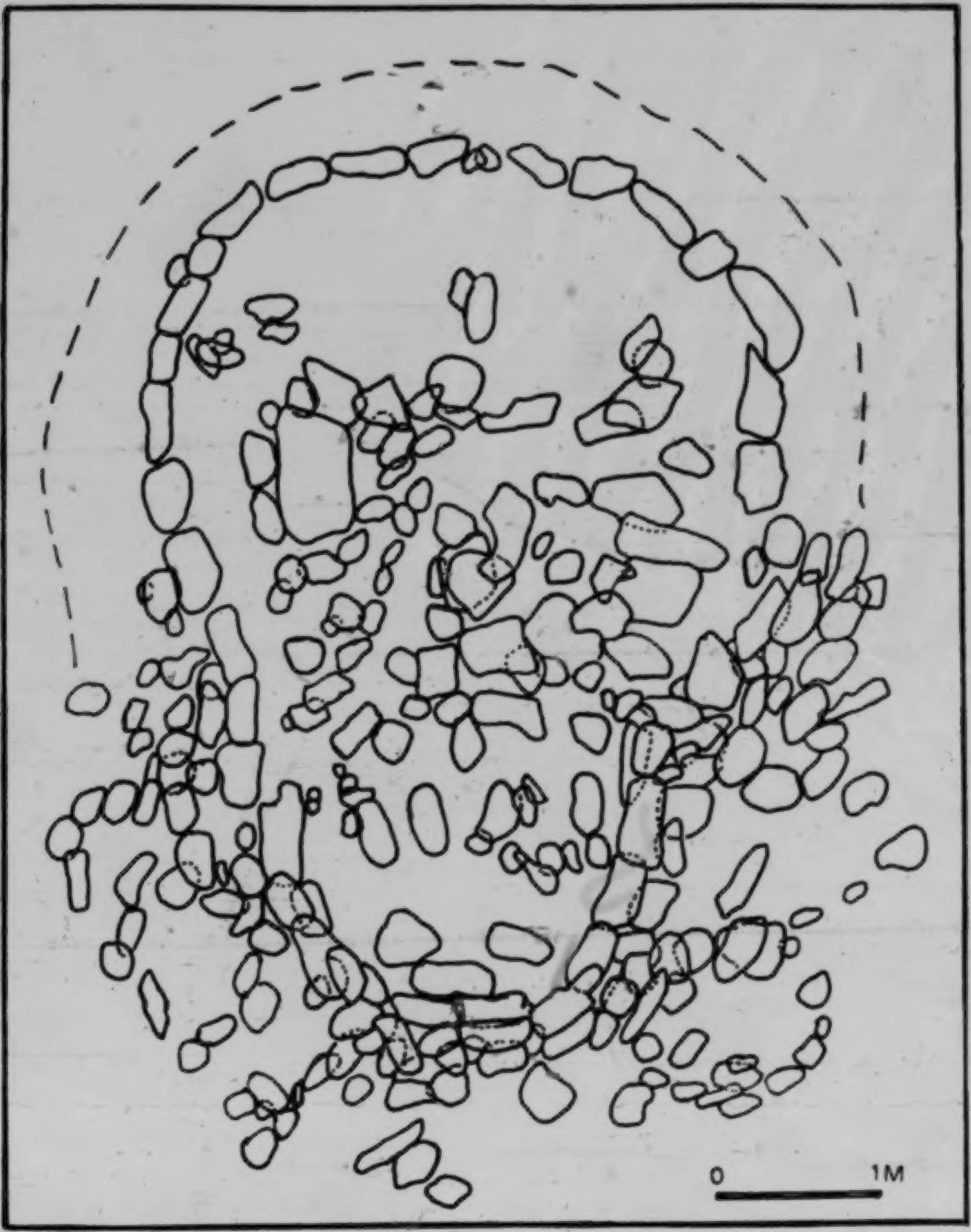


Figure 81. 'Heavy' early Historic tent ring excavated at site 82-24 in the Netsilik Lake area.

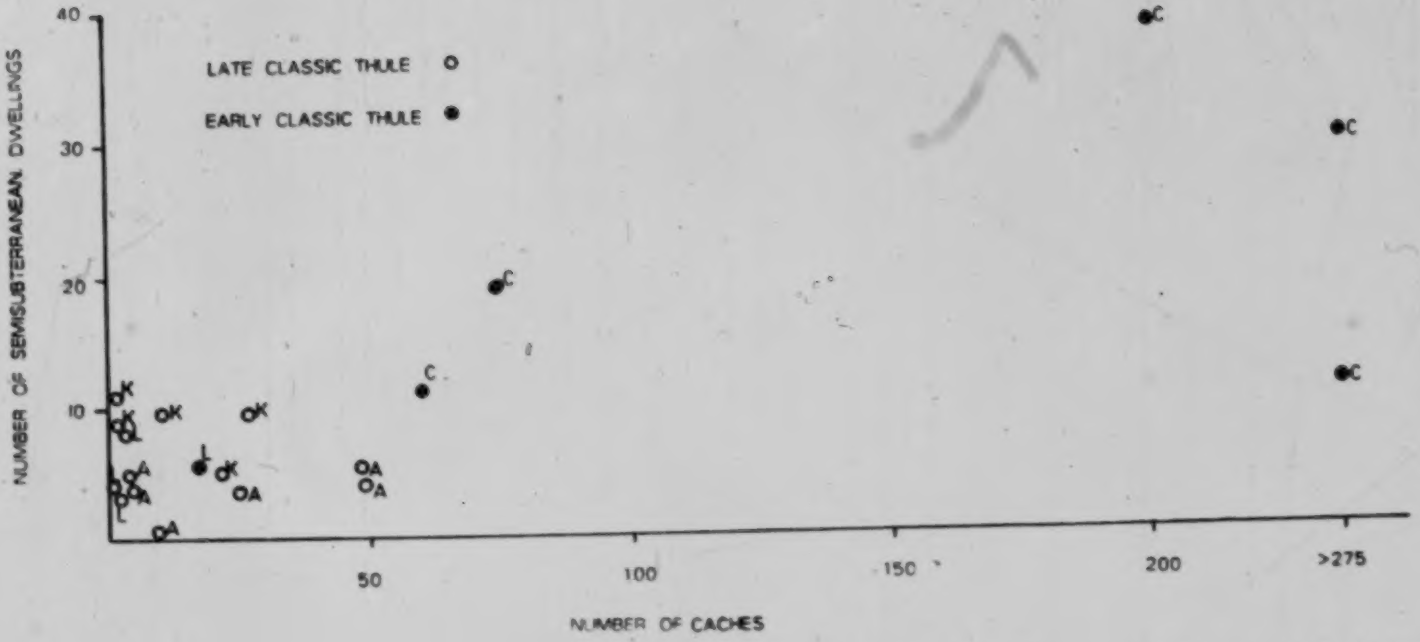


Figure 82. Number of caches within a 2 km radius of early and late Classic semisubterranean dwelling sites/components according to number of dwellings. a-Aston Bay; C-Creswell Bay; K-King William Island; L-Lord Mayor Bay; N-Netsilik Lake.

the Modified Thule and early Historic period.

Test Implication 6

> "Early Classic Thule sites should be internally relatively highly structured while later sites should show a trend toward decreasing internal site structure."

The internal site structure of winter residential sites can be expected to most closely approach the actual community pattern, since, at least for Thule occupations, they represent the site type with the most use overlap of features, and, for all periods, winter represents the season of expected maximum group aggregation.

There is a very definite trend on Somerset Island from relatively highly structured sites during the early Classic Thule period to more loosely structured sites during the late Classic Thule period (see Figures 83-89 and the summary Figure 100: Sites 80-93 and 80-164a are not represented, as logistical problems prevented an anticipated return to these sites during later helicopter surveys, when detailed examinations were intended). While the trend may be in part due to the generally corresponding decrease in site size, the single large site on the north coast of Creswell Bay (PeJr2 - see Figure 89) suggests the trend is real. It could further be argued that site patterns merely reflect preferred dwelling locations according to local topography (for example, multiple rows of dwellings merely reflect multiple raised beaches). Raised beach topography especially will influence site patterning, but only to the extent that it constrains it. Raised beach topography cannot explain multiple versus

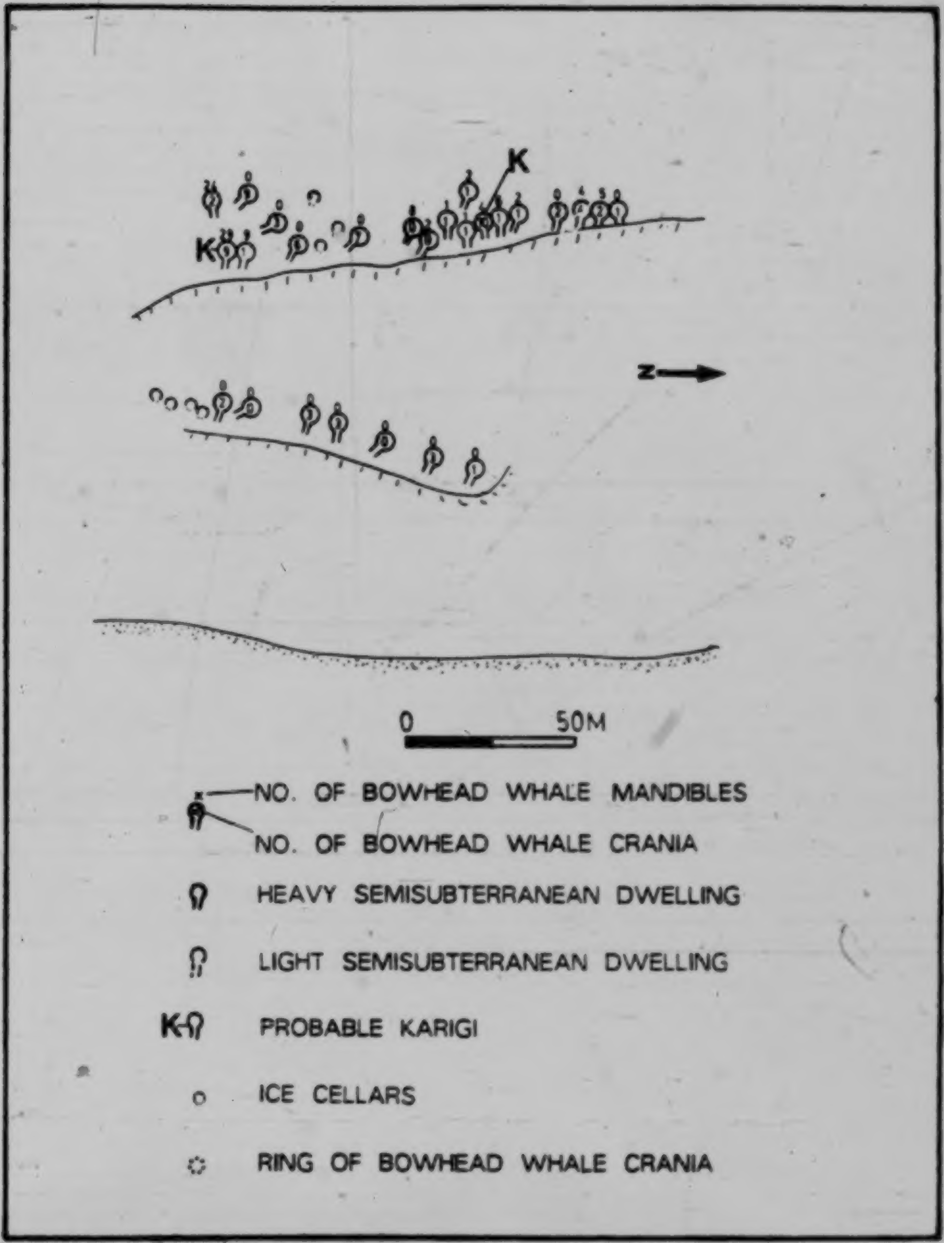

K
K
N
0
50M
NO. OF BOWHEAD WHALE MANDIBLES
NO. OF BOWHEAD WHALE CRANIA
HEAVY SEMISUBTERRANEAN DWELLING
LIGHT SEMISUBTERRANEAN DWELLING
K
PROBABLE KARIGI
ICE CELLARS
RING OF BOWHEAD WHALE CRANIA

Figure 83. Sketch map of semisubterranean dwellings at the early Classic Thule site 80-58, Creswell Bay, showing distribution of bowhead whale mandibles and crania. Data from McCartney 1978.

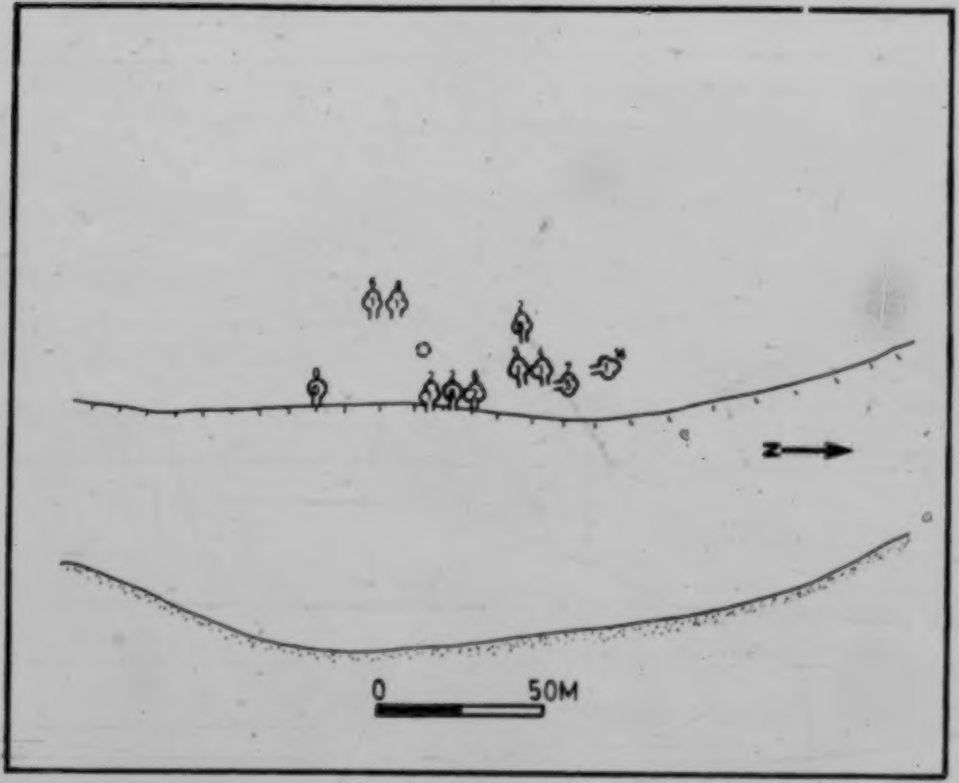


Figure 84. Sketch map of semisubterranean dwellings at the early Classic Thule site 80-86, Creswell Bay, showing distribution of bowhead whale mandibles and crania. Data from McCartney 1978. Legend as for Figure 83.

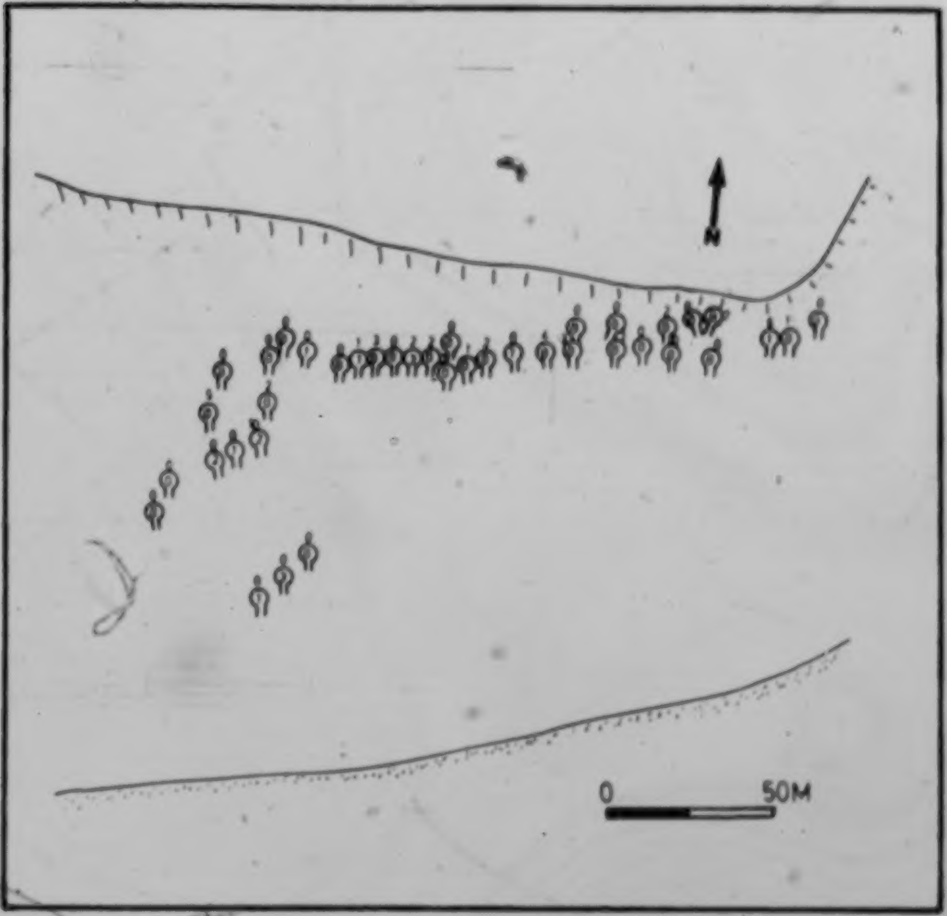
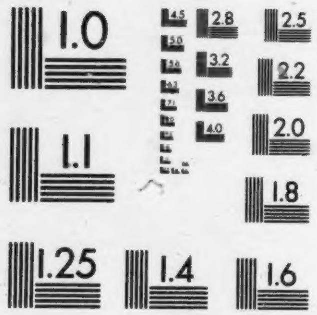


Figure 85. Sketch map of semisubterranean dwellings at the early Classic Thule site of 80-96, Creswell Bay, showing distribution of bowhead whale mandibles and crania. Data from McCartney 1978.

4


1.0
4.5
5.0
5.6
6.3
7.1
8.0
9.0
2.8
3.2
3.6
4.0
2.5
2.2
2.0
1.1
1.8
1.25
1.4
1.6

MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS
STANDARD REFERENCE MATERIAL 1010a
(ANSI and ISO TEST CHART No. 2)

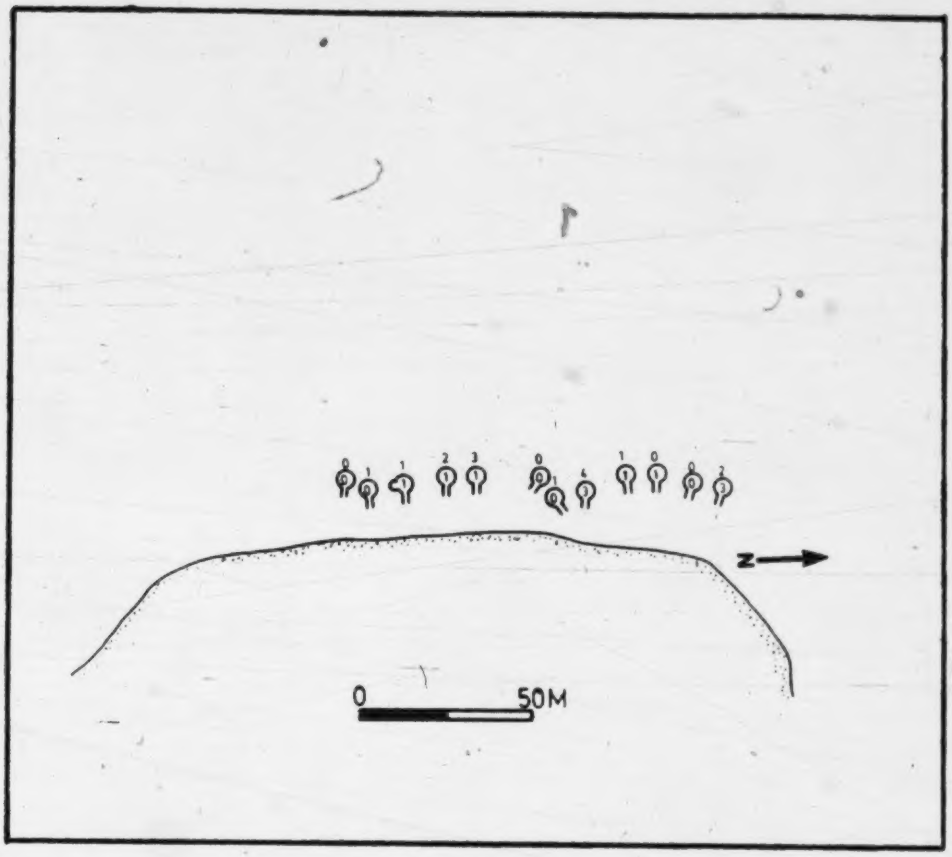

0
1
1
2
3
0
1
4
1
0
0
2
0
0
1
1
1
0
0
3
1
1
0
3
N
0
50M

Figure 86. Sketch map of semisubterranean dwellings at the early Classic Thule site 80-111, Creswell Bay, showing distribution of bowhead whale mandibles and crania. Data from McCartney 1978.

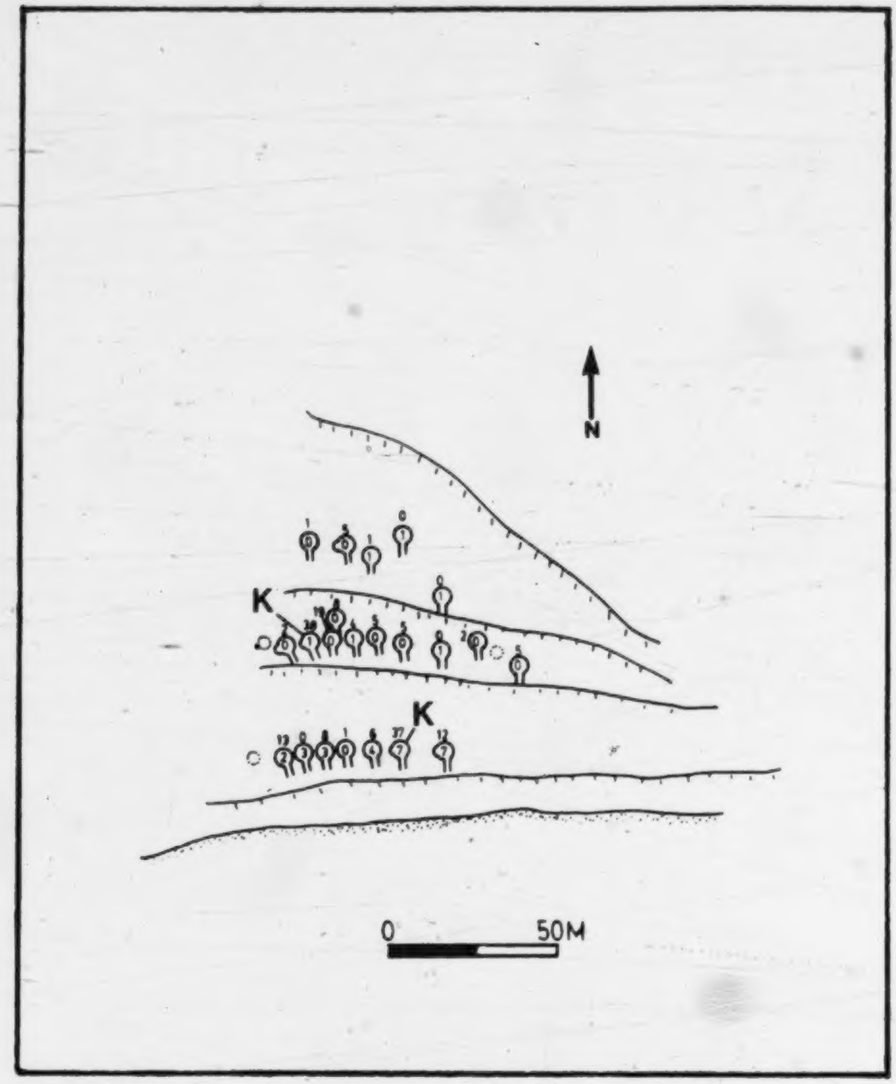


Figure 87. Sketch map of semisubterranean dwellings at the early Classic Thule site PeJq-1, northern Creswell Bay, showing distribution of bowhead whale mandibles and crania. Data from McCartney 1978.

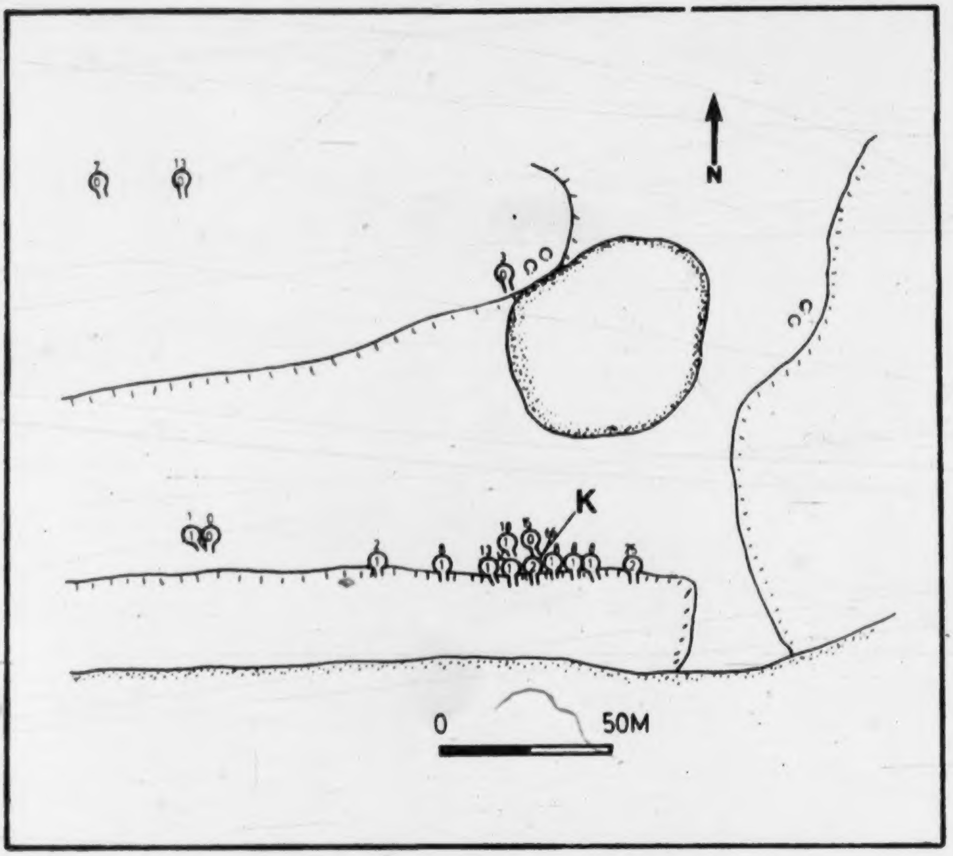


Figure 88. Sketch map of semisubterranean dwellings at the Classic Thule site of PeJr-1, northern Creswell Bay. Data from McCartney 1978. Legend as for Figure 83.

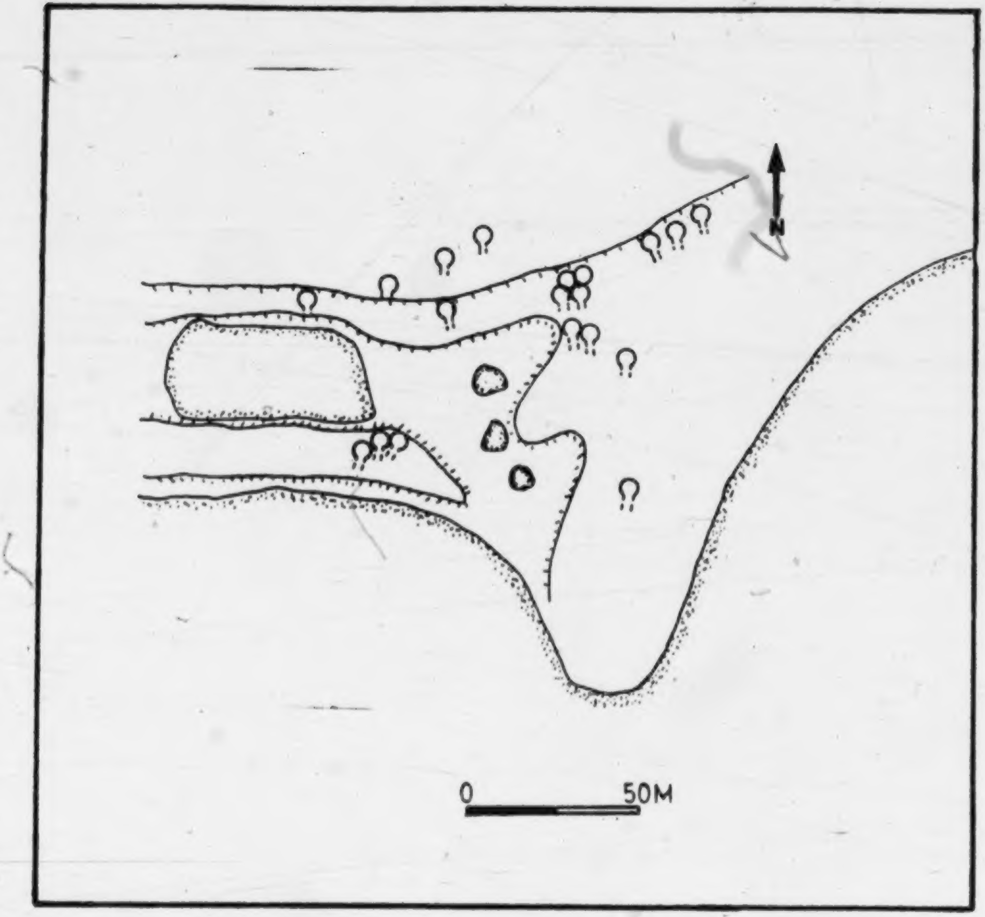


Figure 89. Sketch map of late Classic Thule semisubterranean dwellings at PeJr-2, northern Creswell Bay. Data from McCartney 1978. Legend as for Figure 83.

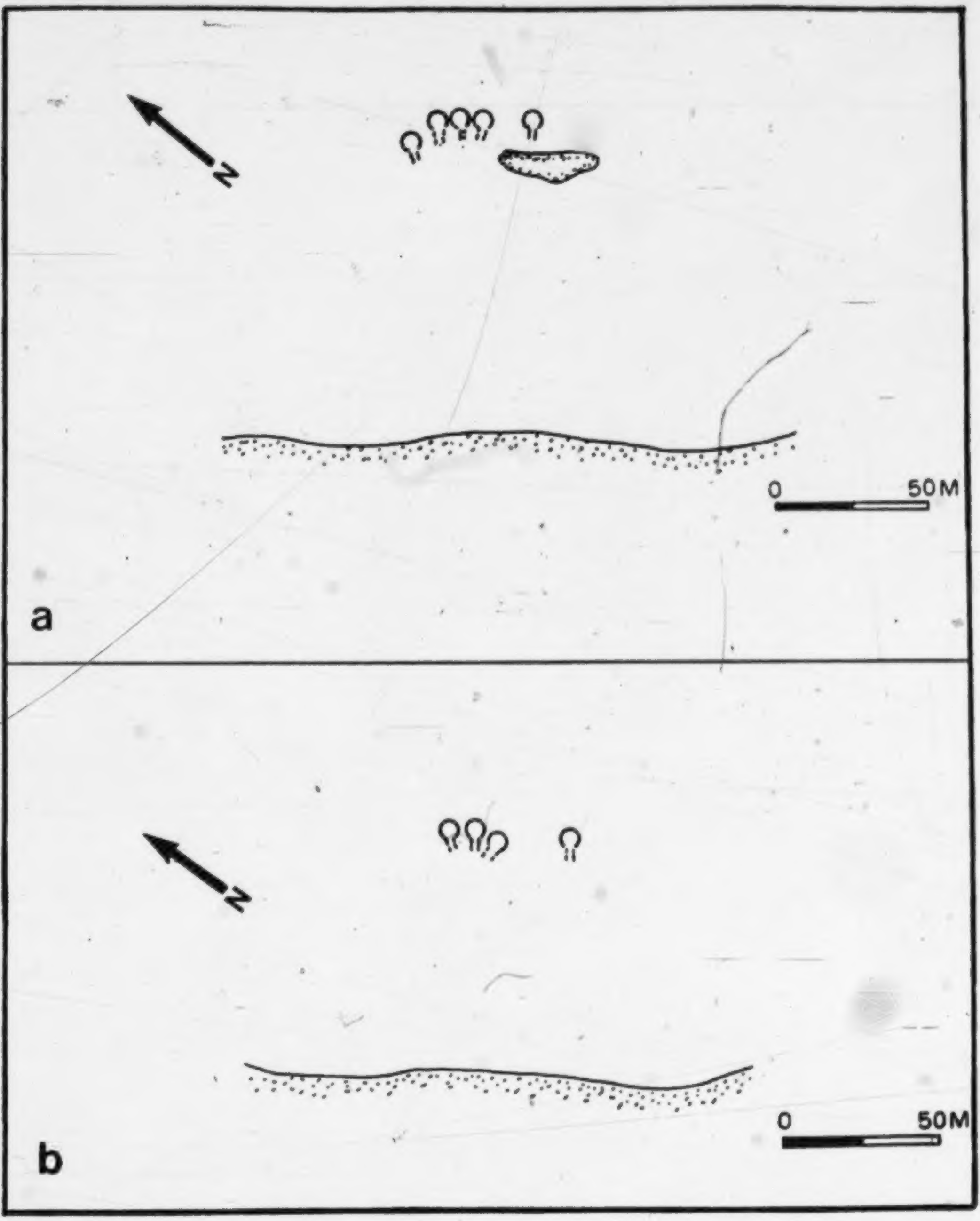

N
0
50M
a
N
0
50M
b

Figure 90. Sketch map of semisubterranean dwellings at the late Classic – Thule sites a) 80-126 and b) 80-130. Legend as for Figure 83.

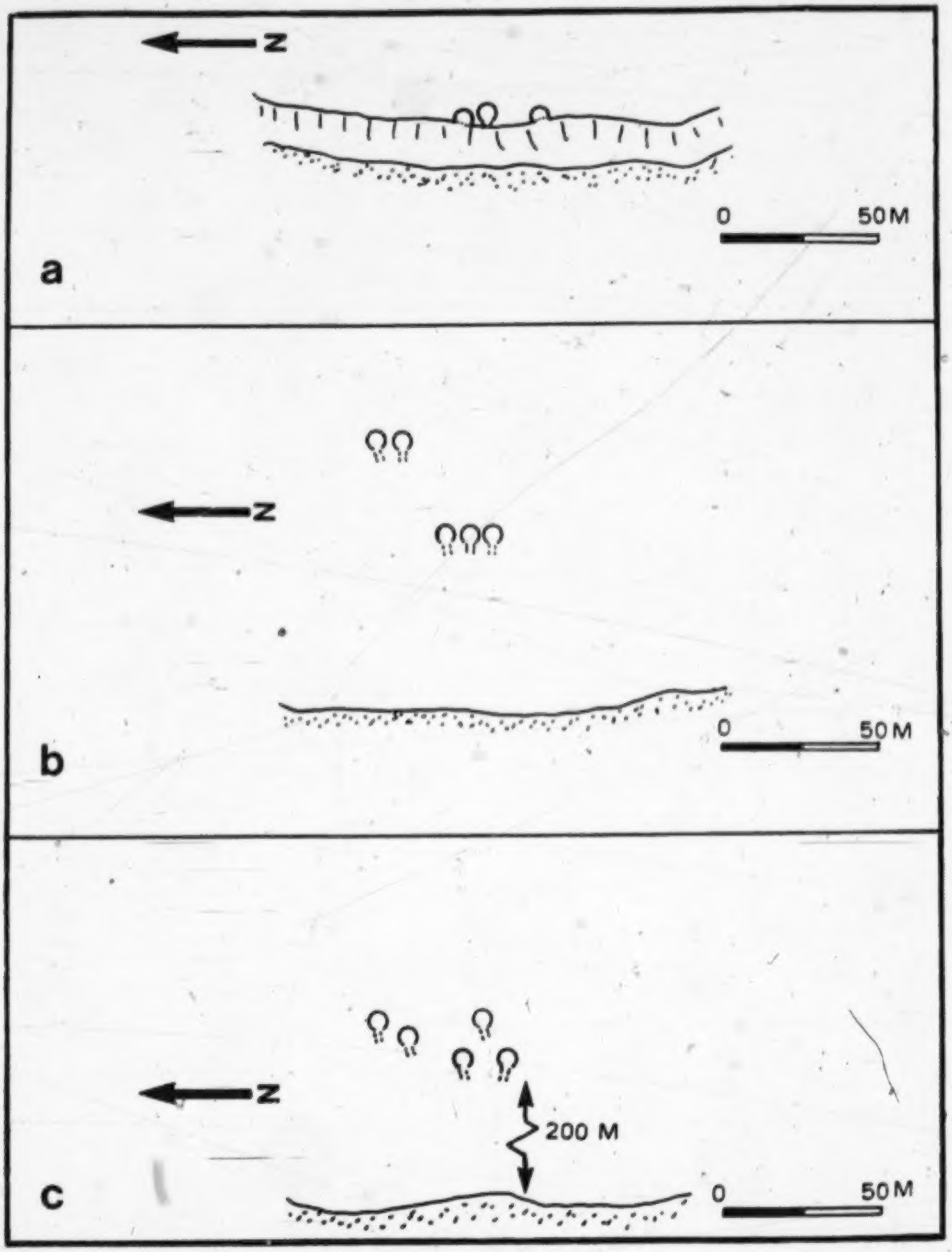

N
0
50M
a
N
0
50M
b
N
200 M
0
50M
c

Figure 91. Sketch map of semisubterranean dwellings at the late Classic Thule sites a) 80-134, b) 80-136, and c) 80-149. Legend as for Figure 83.

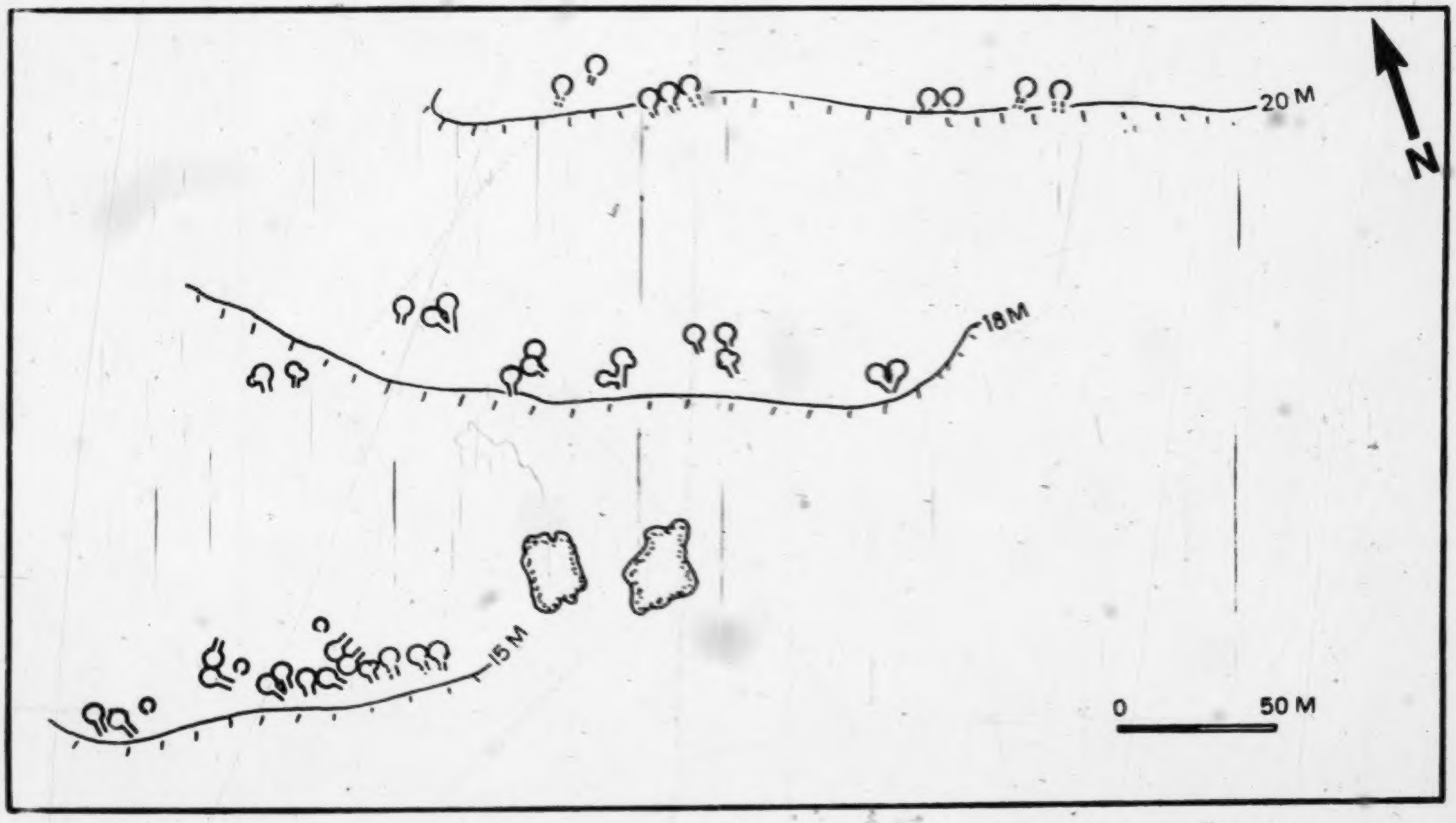


Figure 92. Sketch map of semisubterranean dwellings at the early and late Classic Thule site 81-61 (Malerualik), King William Island. Legend as for Figure 83.

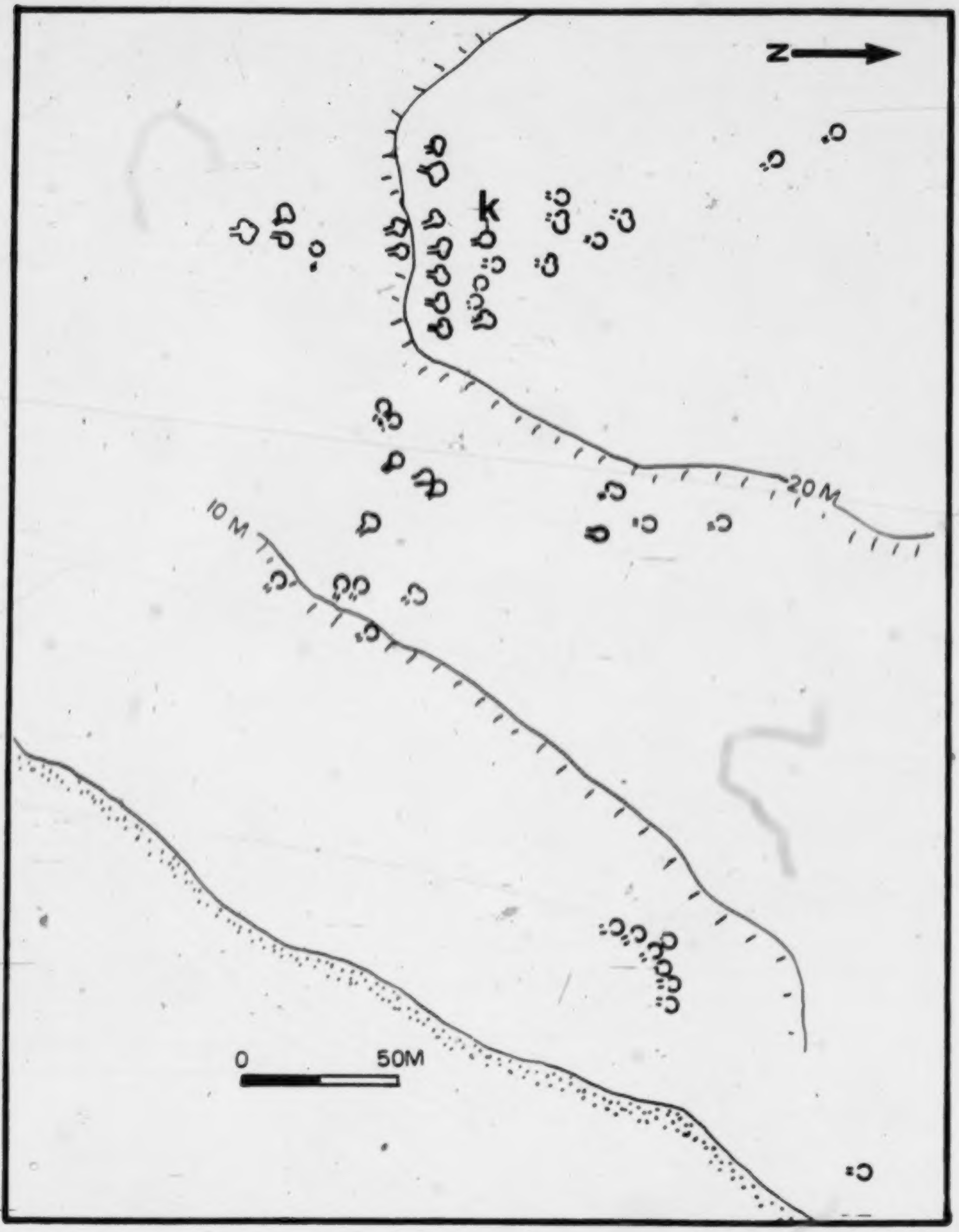


Figure 93. Sketch map of semisubterranean dwellings at the early and late Classic Thule site 82-11, Sherman Inlet. Legend as for Figure 83.

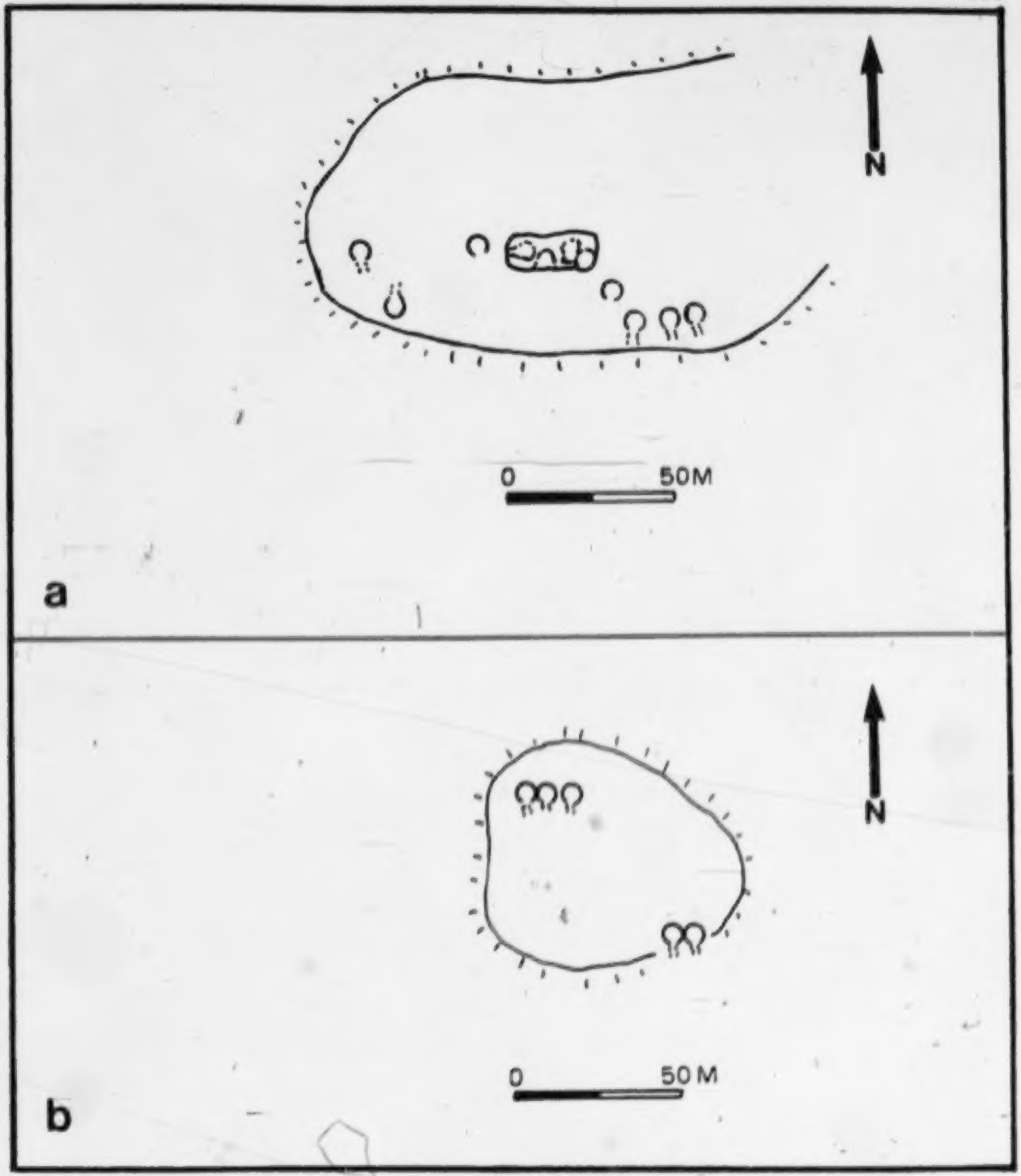


Figure 94. Sketch map of semisubterranean dwellings at the late Classic Thule sites a) 81-4 and b) 81-5, King William Island. Legend as for Figure 83.

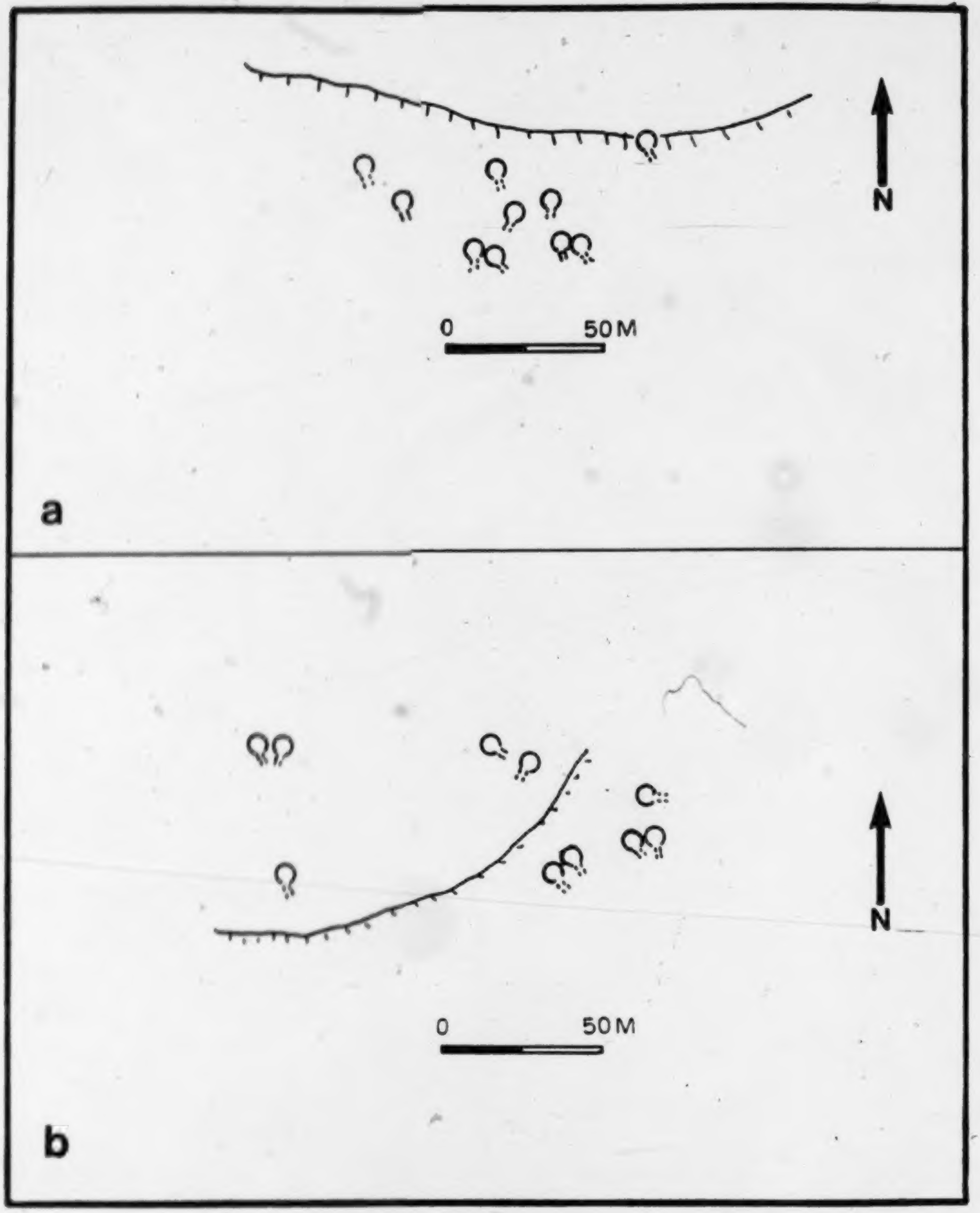


Figure 95. Sketch map of semisubterranean dwellings at the late Classic Thule sites a) 81-52, and b) 81-54, King William Island. Legend as for Figure 83.

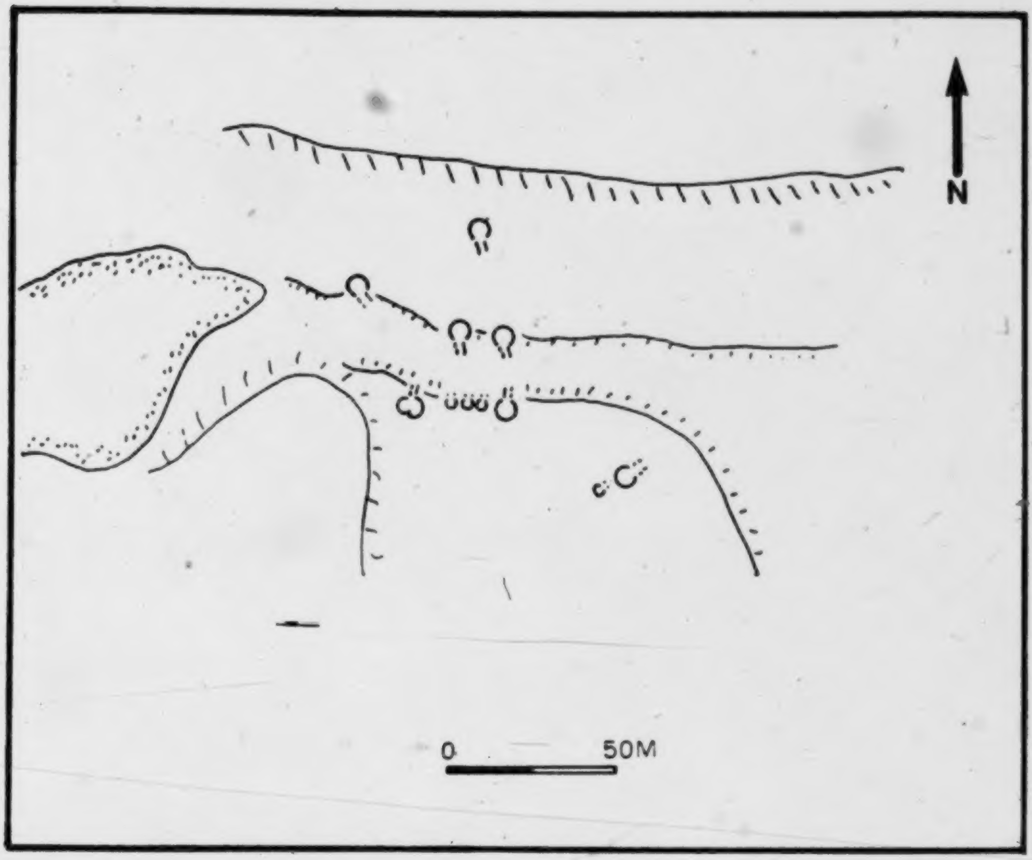


Figure 96. Sketch map of semisubterranean dwellings at the late Classic Thule site 81-73, King William Island. Legend as for Figure 83.

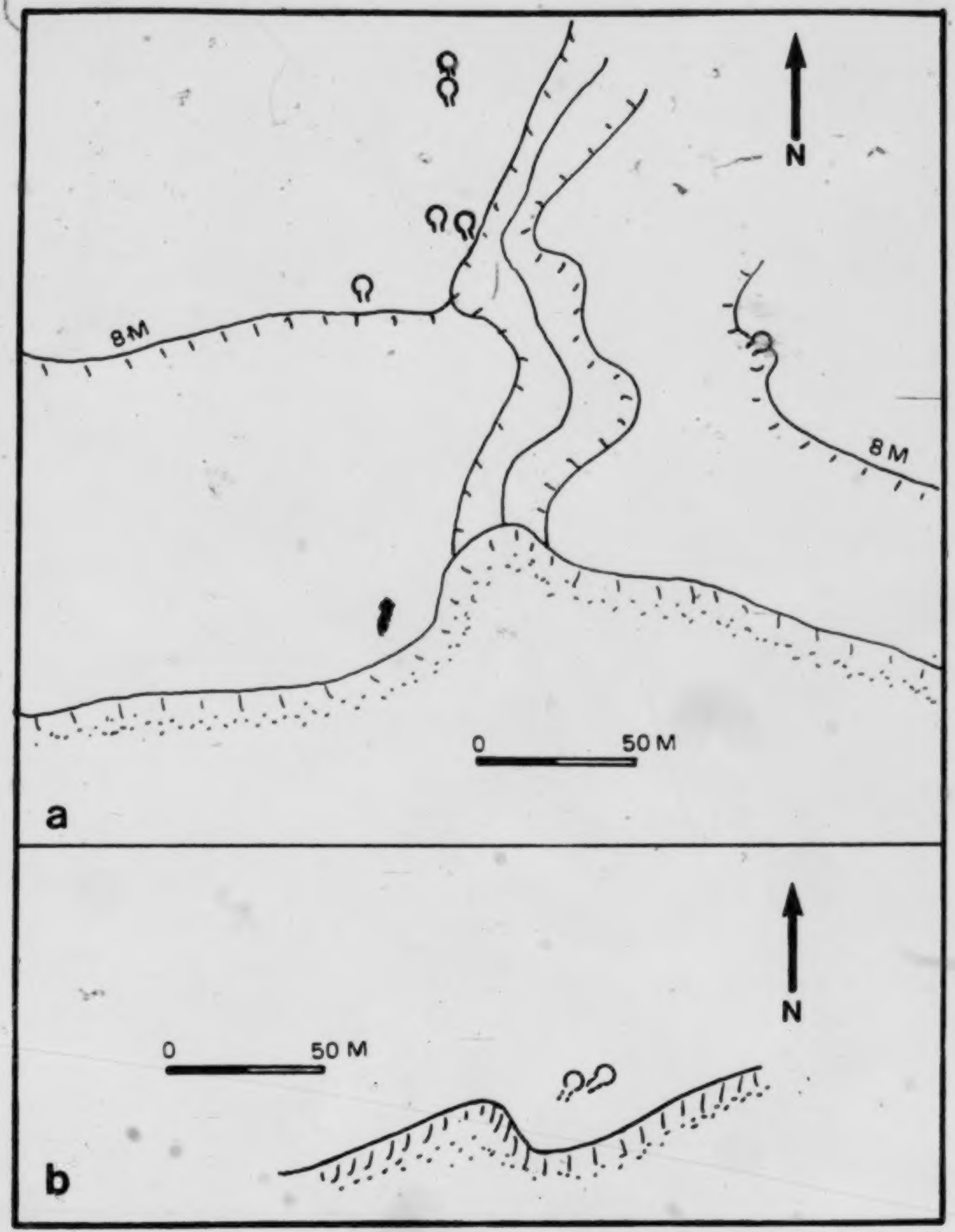


Figure 97. Sketch map of semisubterranean dwellings at the early Classic Thule site a) 81-80, and the early Classic Thule site b) 81-85, both in the Lord Mayor Bay area. Legend as for Figure 83.

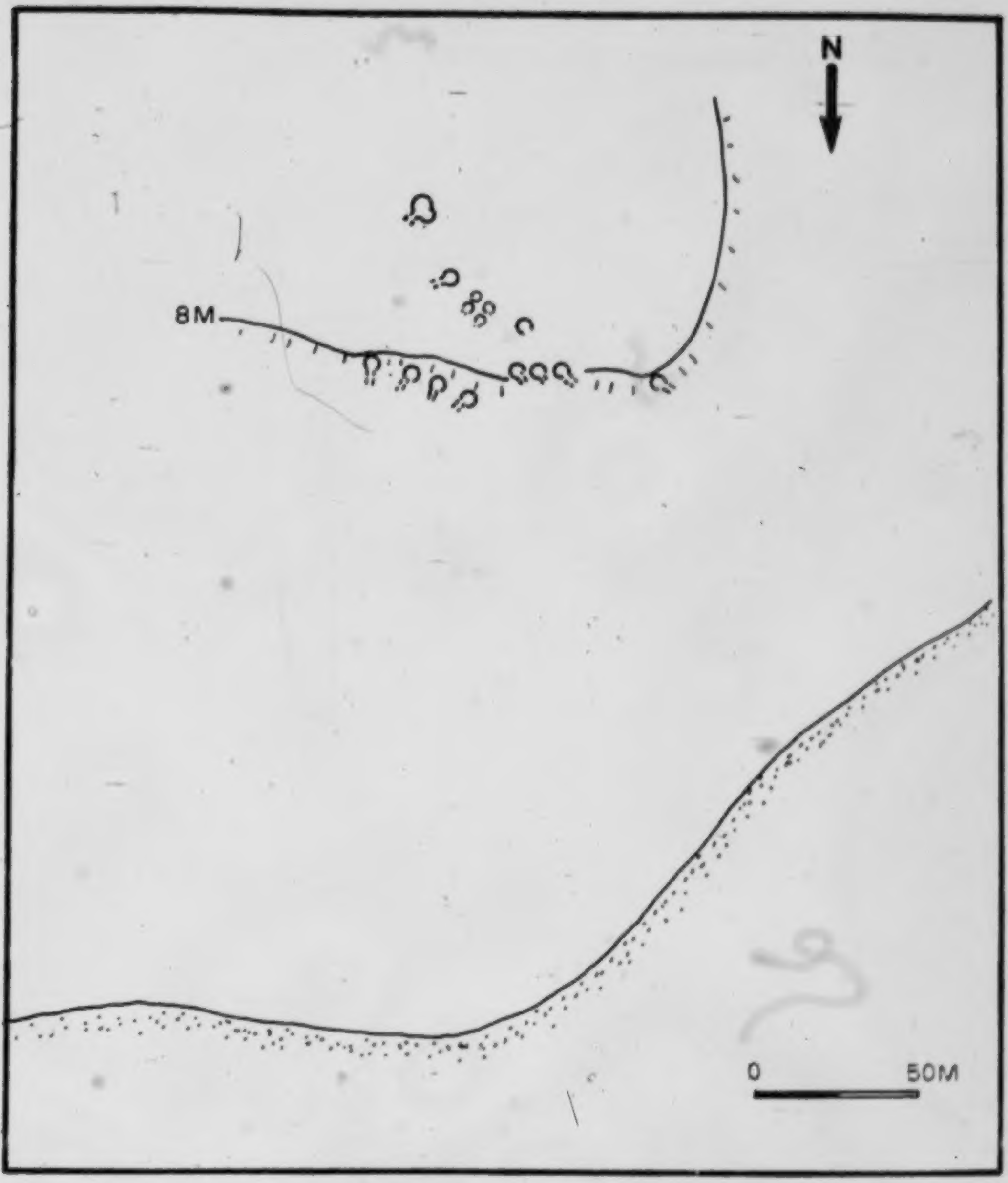


Figure 98. Sketch map of semisubterranean dwellings at the late Classic Thule site 82-17, Netsilik Lake. Legend as for Figure 83.

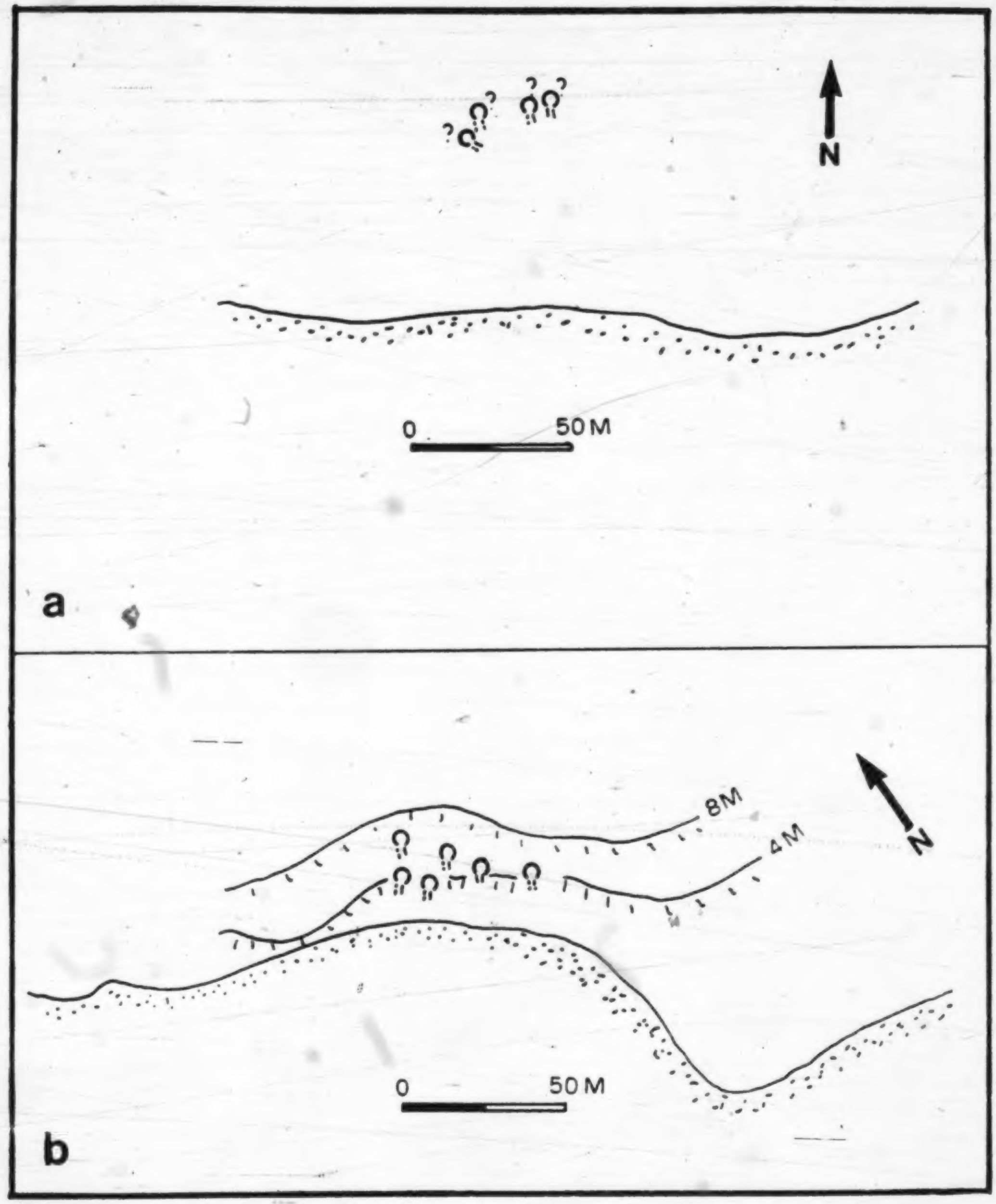


Figure 99. Sketch map of semisubterranean dwellings at the late Classic Thule sites a) 82-16, and b) 82-23, Netsilik Lake. The exact number and distribution of the dwellings at site 82-16 could not be determined due to the extreme disturbance of the site.

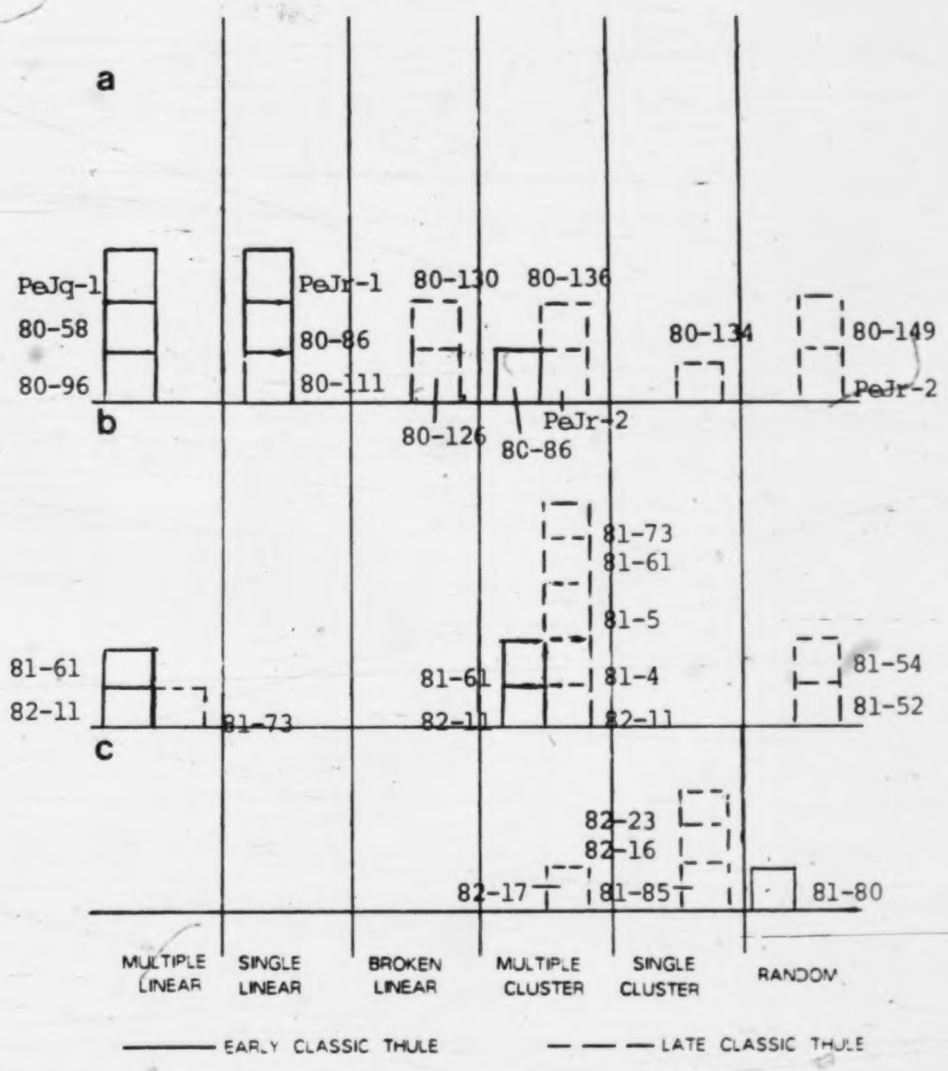

a
PeJq-1
80-58
80-96
PeJr-1
80-86
80-111
80-130
80-136
80-134
80-149
PeJr-2
b
80-126
80-86
PeJr-2
81-73
81-61
81-5
81-4
81-61
82-11
81-73
81-61
82-11
82-11
81-54
81-52
c
82-23
82-16
82-17
81-85
81-80
MULTIPLE LINEAR
SINGLE LINEAR
BROKEN LINEAR
MULTIPLE CLUSTER
SINGLE CLUSTER
RANDOM
EARLY CLASSIC THULE
LATE CLASSIC THULE

Figure 100. Summary of internal structure of the various semisubterranean sites illustrated in Figures 83-99, based on subjective assessments. See Figure 20 for categories of internal site structure. a-Somerset Island; b-King William Island-Adelaide Peninsula; c-Lord Mayor Bay-Netsilik Lake.

single row sites, nor can it explain spacing within individual rows (i.e. continuous versus isolated or clustered). Furthermore, even though there are constraining land forms at Sherman Inlet (Site 82-11), there are differences between early and late Classic Thule dwelling patterns.

In addition, several of the early Classic Thule sites also contain structures which are interpreted as karigi (see e.g. Plate 8b) or structures consisting of upright circles of bowhead whale crania which may also be related to whaling ceremonialism (see e.g. Figures 84 and 87, and Plate 9b). Furthermore, McCartney (1978) has identified a number of other features at several of the sites, which although not a great deal larger in size than other features at the respective sites, contain significantly greater amounts of structural bowhead whale crania and/or mandibles (see e.g. Figures 83, 87, 88). These structures may have functioned as karigi and/or they may indicate a different status of the occupants (e.g. whaling crew leader). The excavation of one of these structures at site 80-58 by McCartney (1979a) revealed very small 'side-benches' but no sleeping platforms, leading him to suggest they may have functioned as 'dance-houses'.

In the King William Island and Adelaide Peninsula region, the trend from early Classic to Late Classic Thule is also one of decreasing internal site structure, although it is not as pronounced (see Figures 92-99 and summary Figure 100), and only the Sherman Inlet site contains a structure which is interpreted as a karigi (see Figure 93 and Plate 9a). One unusual, and certainly unique structure (for this region) is the large multiroomed structure contained in site (81-4) at Booth Point (see Figure 94a). The structure is atypical for the central and high Arctic, and is most closely allied to several multiroomed communal Historic Inuit dwelling structures in Labrador (Schledermann 1976b; personal observation 1978).

In the Lord Mayor Bay and Netsilik Lake area, there is no corresponding trend in decreasing site structure from early to late Classic Thule. Instead, the tendency is toward generally low organizational structure throughout (see Figures 97-99).

For the southern area generally, there are no published detailed plans of historic winter residential sites. However, approximations of general site structure can be obtained from sketches by 19th century European and Euroamerican explorers into the area, and are represented in Figure 101. With the exception of the Cape Hendon site (Figure 101a), most are small clusters (the small site size probably being a reflection of smaller groups during the spring, the period when most explorers visited the area). The single large site at Cape Hendon was recorded by Ross in 1830 and is figured in Ross 1835:249. Ross described the arrangement as "...placed without any order..." (1835:249).

Finally, as anticipated, all large spring-fall residential sites of both Classic Thule and Modified Thule-early Historic affiliation lacked any well-defined internal structure (see e.g. Figures 102-104).

Test Implication 7

> "There should be a trend to decreasing residential site size from the early Classic Thule to the Modified Thule-early Historic period."

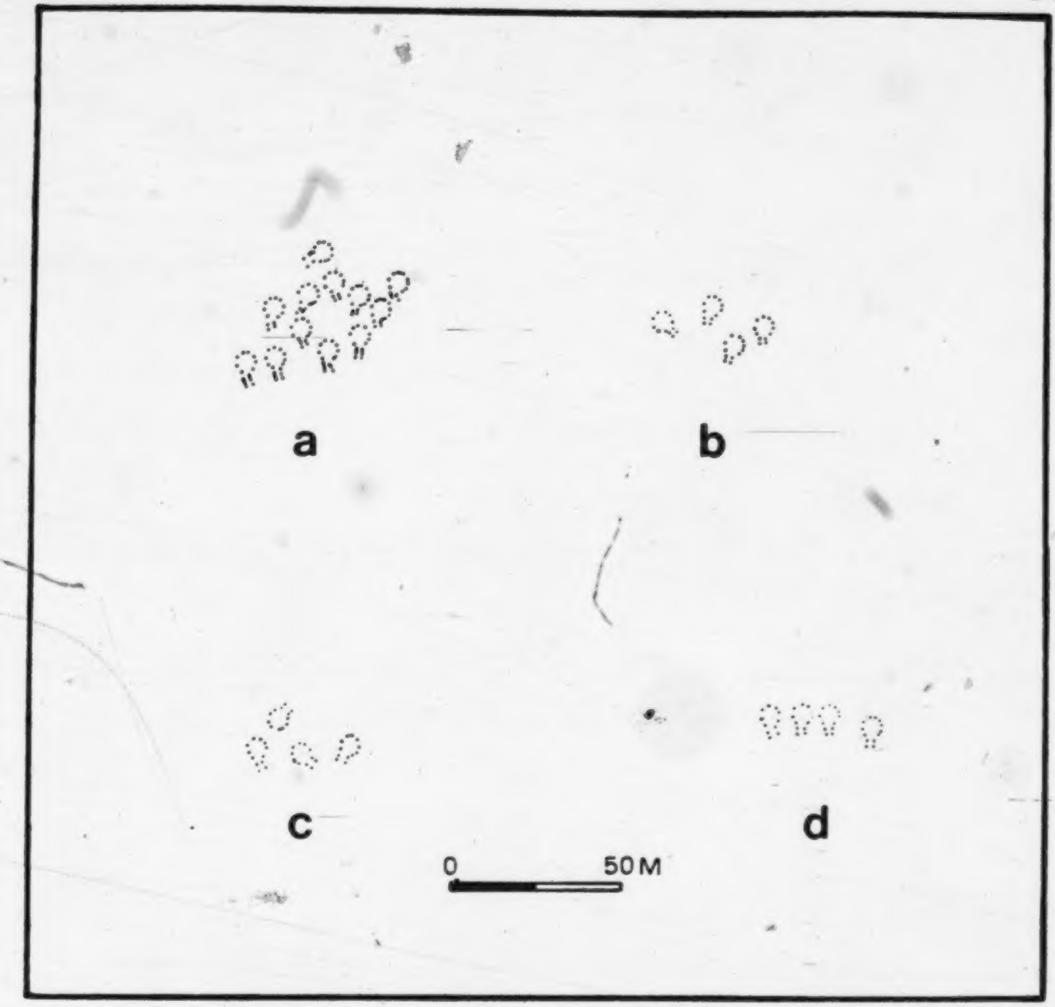


Figure 101. Sketch map of snow dwelling sites in the Netsilik area illustrated by a) Ross 1835:249, b) Schwatka 1883:110, c) Schwatka 1883:252, and d) Amundsen 1908:274.

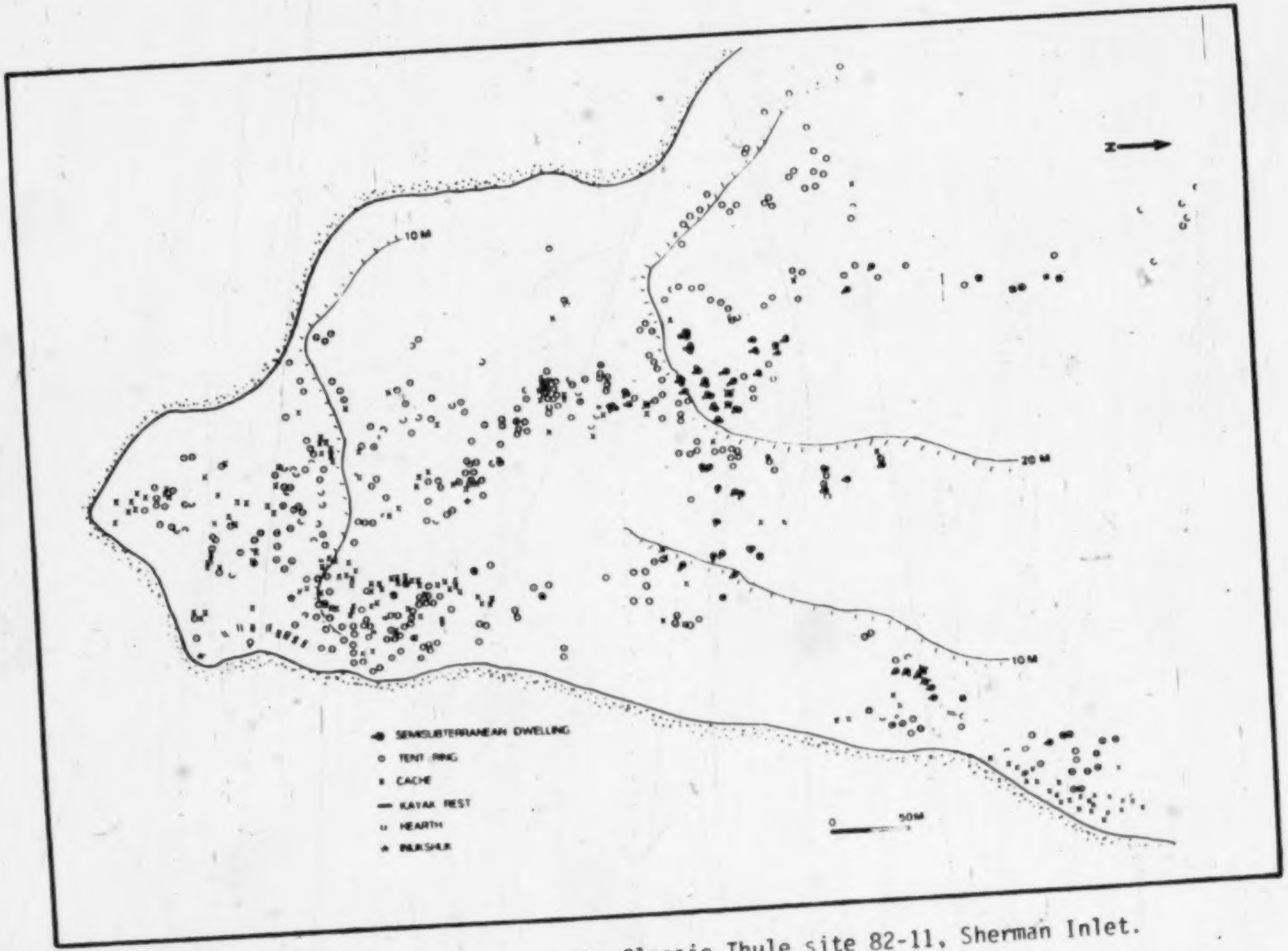

N
10 M
20 M
10 M
SEMISUBTERRANEAN DWELLING
TENT RING
CACHE
KAYAK REST
HEARTH
INUKSHUK
0
50M

Figure 102. Sketch map of features at the Classic Thule site 82-11, Sherman Inlet.

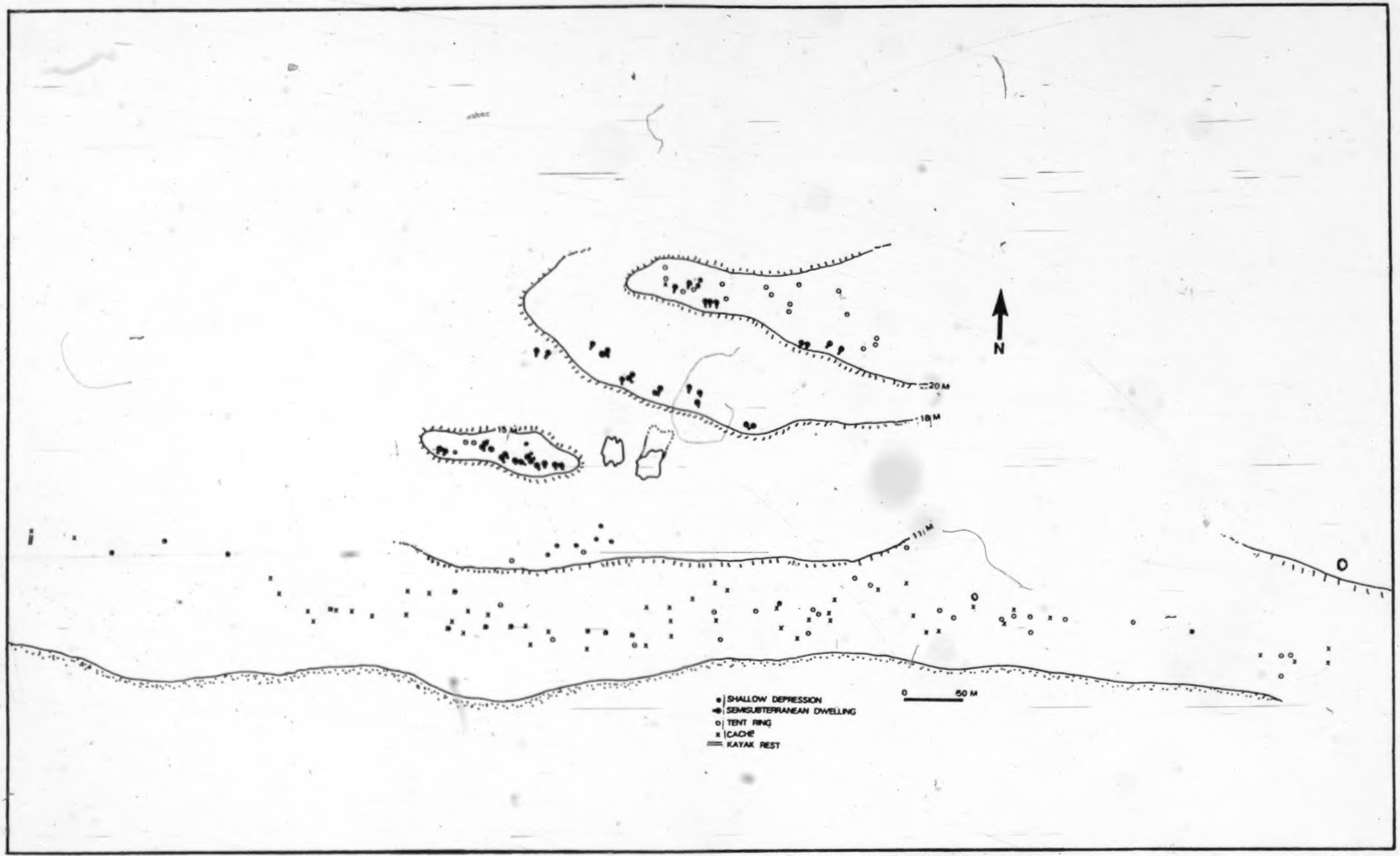

N
20 M
18 M
15 M
11 M
● SHALLOW DEPRESSION
◀● SEMISUBTERRANEAN DWELLING
○ TENT RING
x CACHE
═ KAYAK REST
0
50 M

Figure 103. Sketch map of features at the Classic Thule site 81-61 (Malerualik), King William Island.

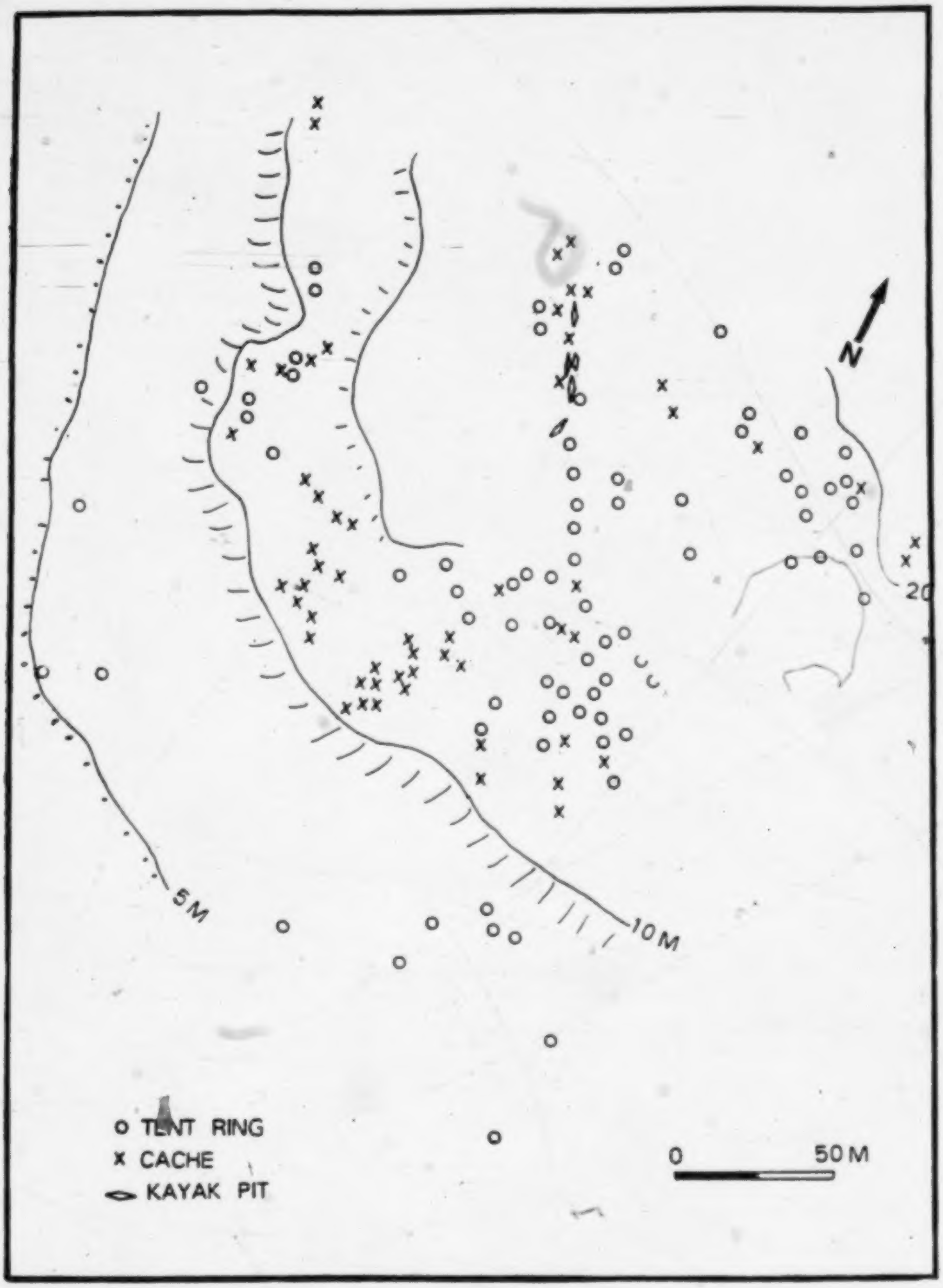

N
5M
10M
20
o TENT RING
x CACHE
KAYAK PIT
0
50 M

Figure 104. Sketch map of features at the early Historic site 82-24, Netsilik Lake.

There is a marked decrease in site size from early Classic Thule to late Classic Thule in the Somerset Island region in both semisubterranean dwelling and tent ring residential sites (Figures 105 and 106), and in the King William Island region, from early to late Classic Thule winter residential sites (although the largest site sizes are approximately equal for both periods - Figure 107), and from Classic Thule to Modified Thule-early Historic spring-fall residential sites (Figure 108). In the Lord Mayor Bay-Netsilik Lake region, on the other hand, there is very little difference in size trends between Classic Thule and Modified Thule-early Historic spring-fall residential sites (Figure 110). The trend for winter residential sites is toward a decrease in size (Figure 108), but it is admittedly based on a comparatively small sample.

Early Historic maximum residential (winter) populations average approximately 100 individuals (Damas 1969a; Balikci 1984; see also Ross 1835), and assuming the 20 and 21 snow dwellings reported by McClintock (1859) to be a maximum for 100 individuals, and the twelve

There is a marked decrease in site size from early Classic Thule to late Classic Thule in the Somerset Island region in both semisubterranean dwelling and tent ring residential sites (Figures 105 and 106), and in the King William Island region, from early to late Classic Thule winter residential sites (although the largest site sizes are approximately equal for both periods - Figure 107), and from Classic Thule to Modified Thule-early Historic spring-fall residential sites (Figure 108). In the Lord Mayor Bay-Netsilik Lake region, on the other hand, there is very little difference in size trends between Classic Thule and Modified Thule-early Historic spring-fall

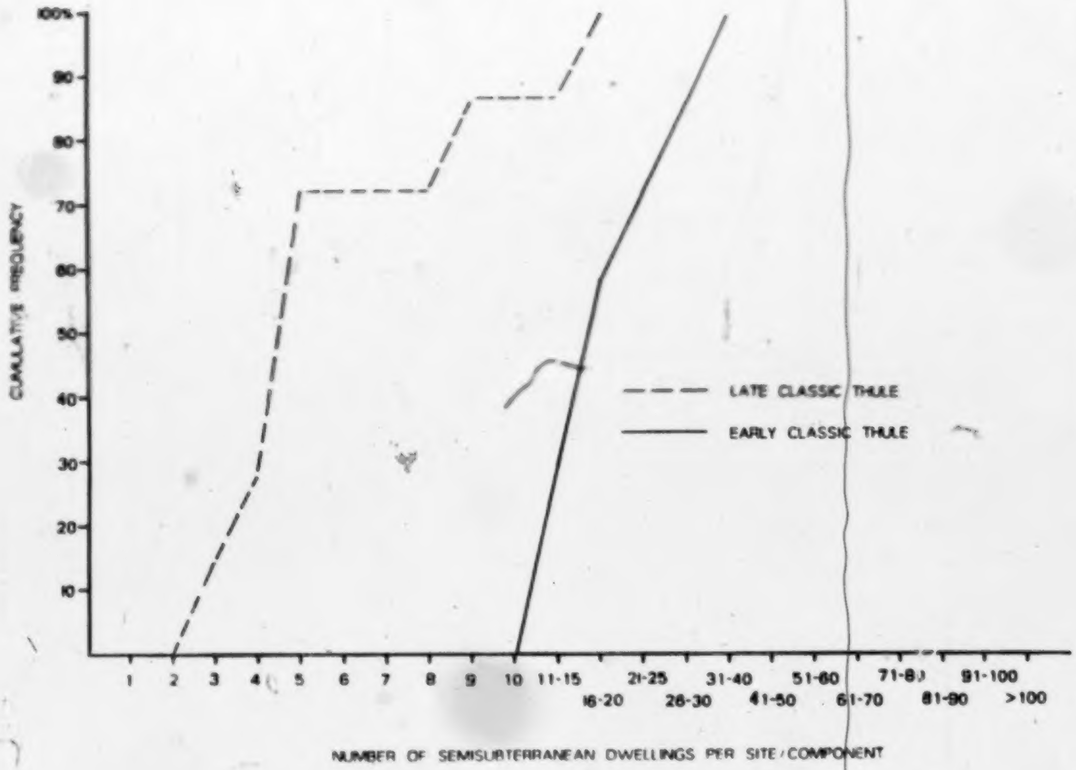


Figure 105. Comparison of frequencies of early Classic Thule (Creswell Bay) and late Classic Thule (Aston Bay) semisubterranean dwelling sites/components according to number of dwellings in the Somerset Island area.

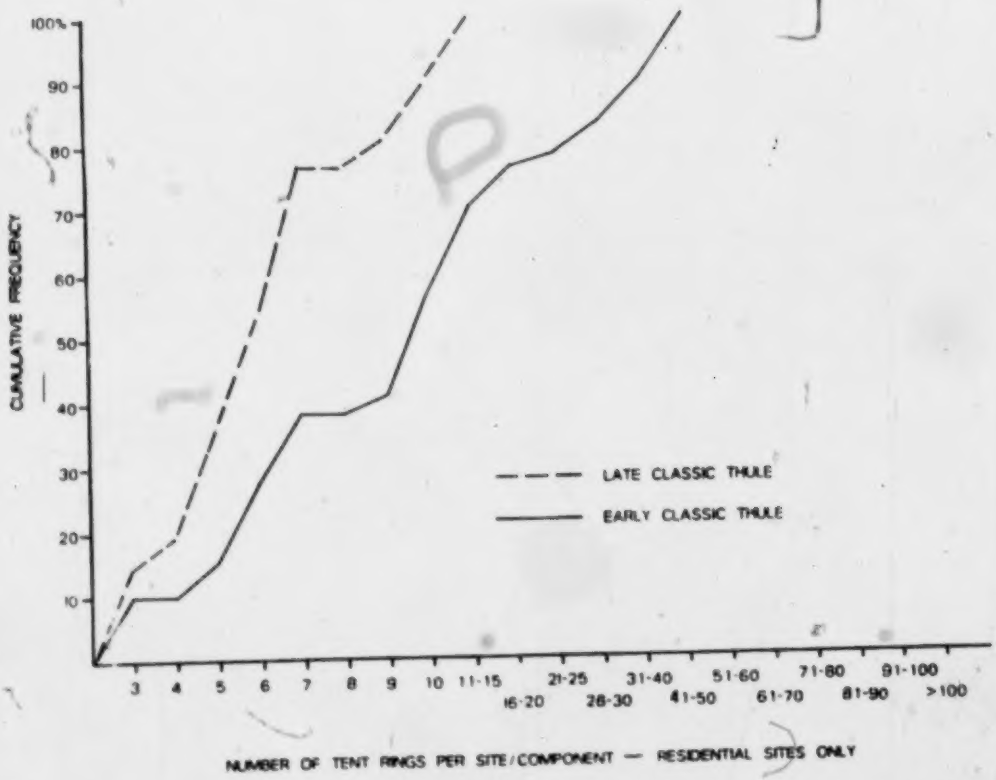


Figure 106. Comparison of frequencies of early Classic Thule (Creswell Bay) and late Classic Thule (Aston Bay) residential tent ring sites/components according to number of tent rings in the Somerset Island area.

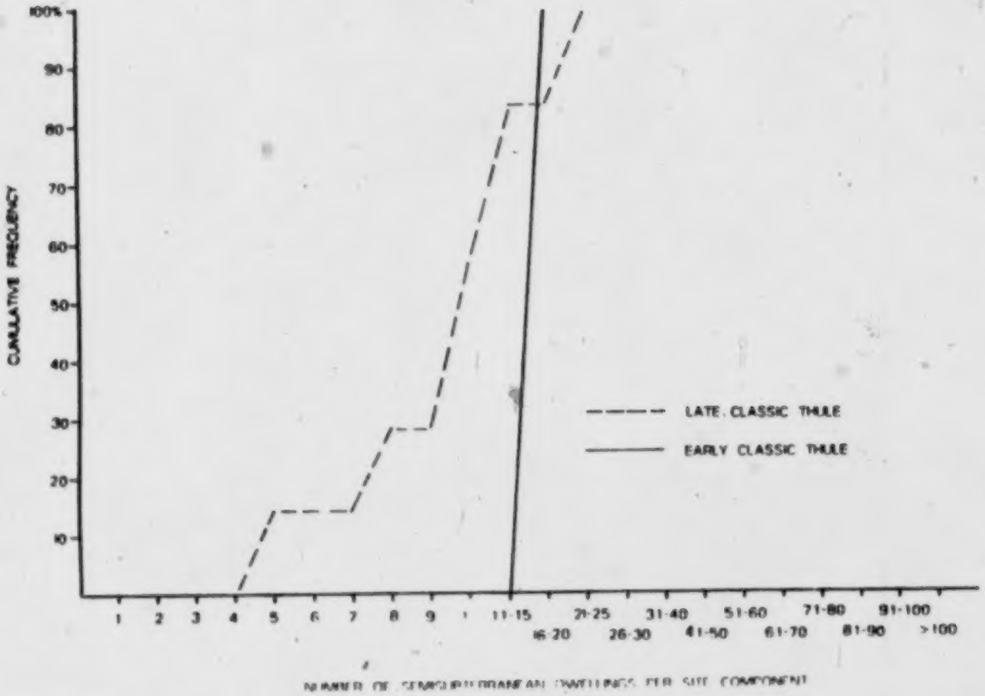


Figure 107. Comparison of frequencies of early Classic Thule and late Classic Thule semisubterranean dwelling sites/components according to number of dwellings in the King William Island-Adelaide Peninsula area.

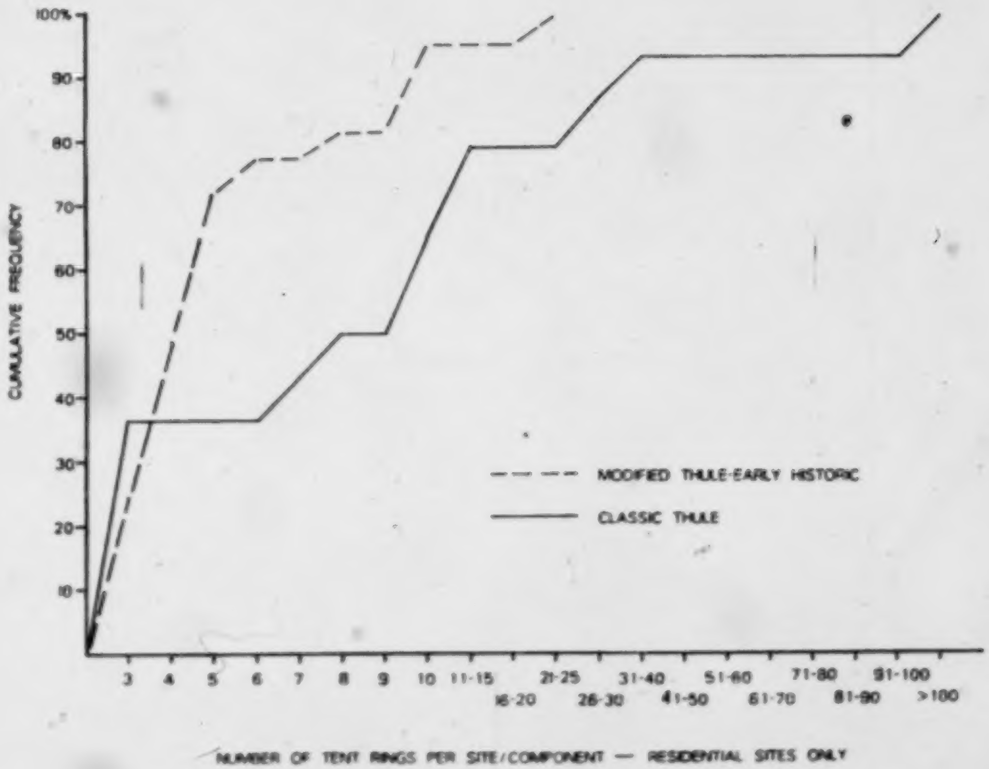


Figure 108. Comparison of frequencies of Classic Thule and Modified Thule-early Historic residential tent ring sites/components according to number of tent rings in the King William Island area.

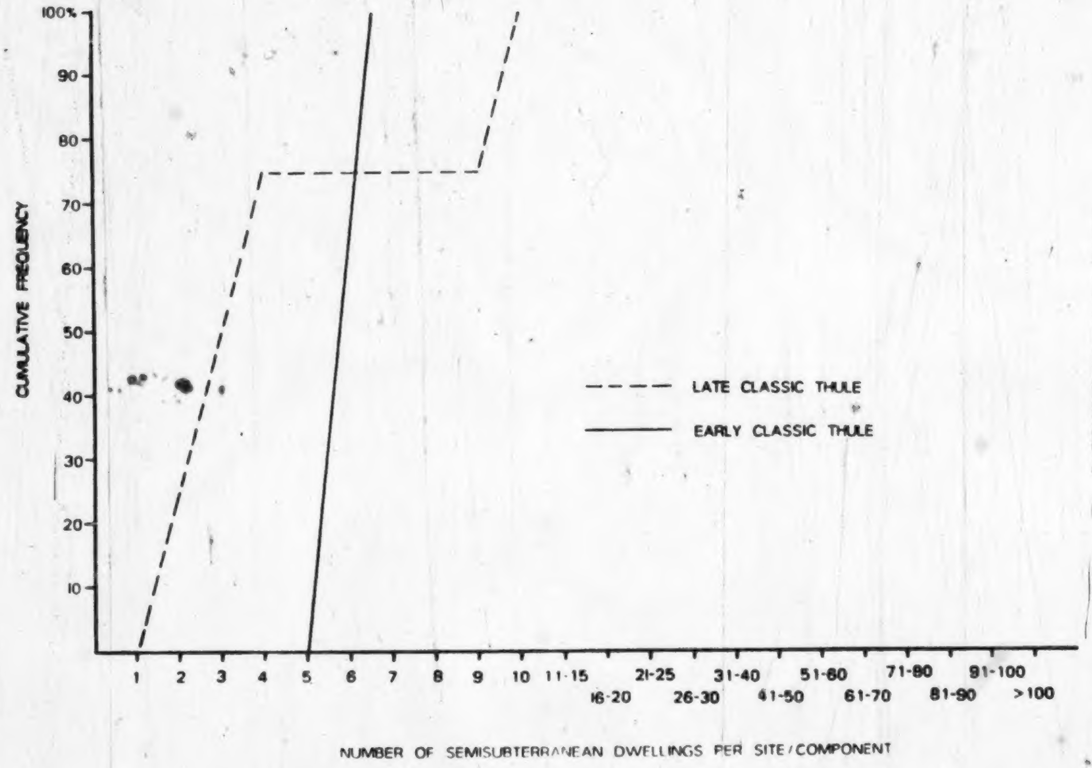


Figure 109. Comparison of early Classic Thule and late Classic Thule semisubterranean dwelling site/component frequencies according to site/component size in the Lord Mayor Bay-Netsilik Lake area.

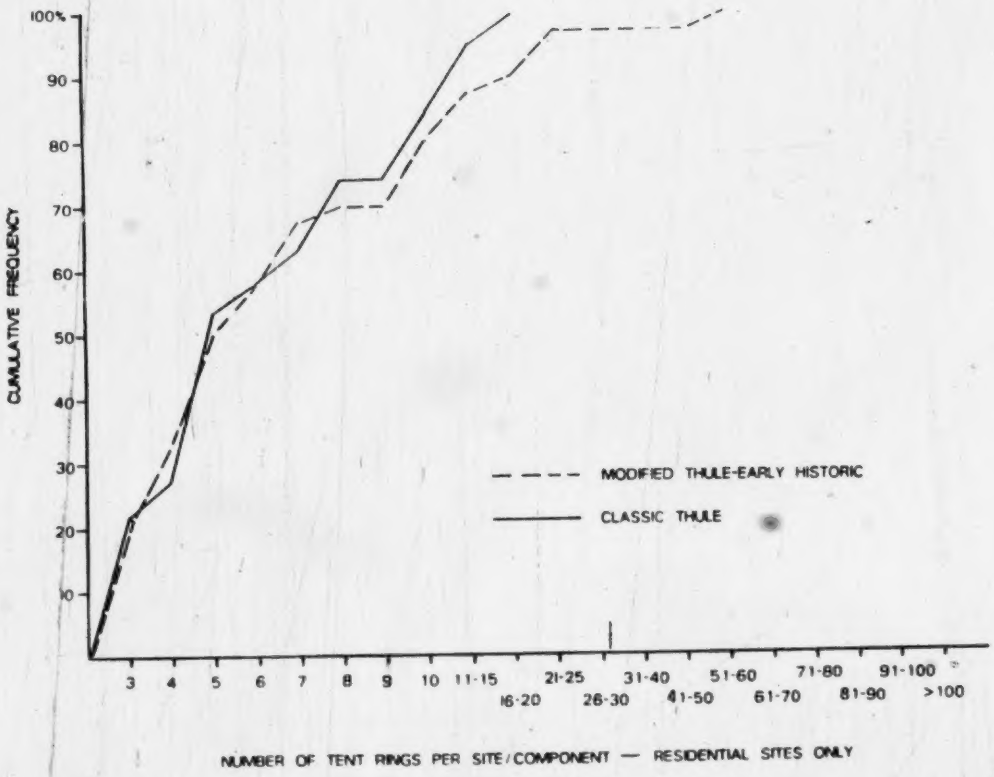


Figure 110. Comparison of Classic Thule and Modified Thule-early Historic residential tent ring site/component frequencies according to site/component size, in the Lord Mayor Bay-Netsilik Lake area.

residential sites (Figure 110). The trend for winter residential sites is toward a decrease in size (Figure 109), but it is admittedly based on a comparatively small sample (i.e. only one for early Classic Thule and four for late Classic Thule).

Early Historic maximum residential (winter) populations average approximately 100 individuals (Damas 1969a; Balikci 1984; see also Ross 1835), and assuming the 20 and 21 snow dwellings reported by McClintock (1859) to be a maximum for 100 individuals, and the twelve dwellings reported by Ross (1835) to be a minimum for 100 individuals (Ross actually reported 99 for the site: Ross 1835:243), then the average number of individuals per dwelling during winter occupations is approximately five to eight. The problems associated with dwelling contemporaneity in estimating archaeological site populations have been discussed previously. However, for purposes of comparison, if an 80% contemporaneous occupation rate is assumed and if archaeological site size is taken to represent the maximum occupation for any given site, then the prehistoric population size should be comparable on a general level. Accordingly, the decreasing trend in winter residential populations from early to late Classic Thule is reversed by the early Historic period in the King William Island region. In the Lord Mayor Bay area, while there is no clear trend from early to late Classic Thule there is nevertheless an overall increase in winter residential populations from the Classic Thule to the early Historic period (Figure 111). The largest populations during either the prehistoric or historic period in the study area, however, are represented by the Creswell Bay early Classic Thule occupations.

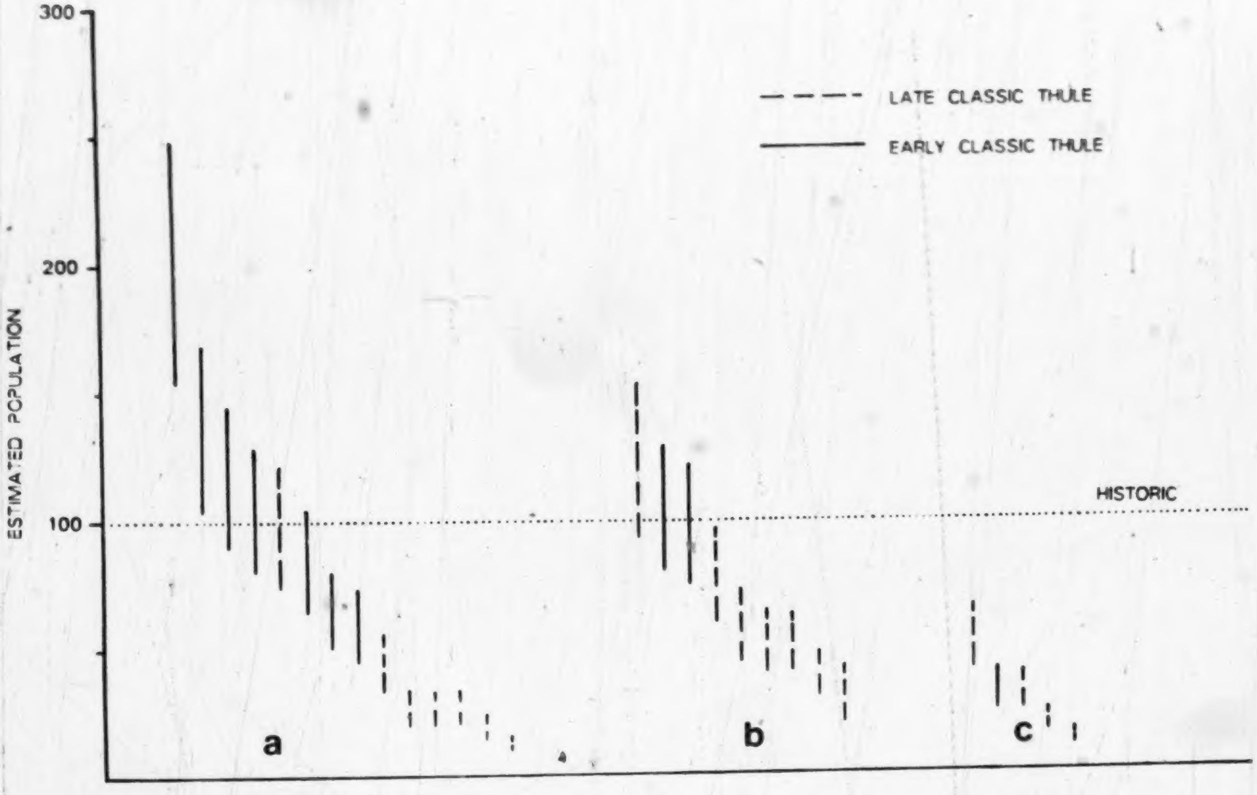


Figure 111. Population estimates for early and late Classic Thule Sites in the study area, and comparison with historic population estimates. a-Somerset Island; b-King William Island-Adelaide Peninsula; c-Lord Mayor Bay-Netsilik Lake.

Test Implication 8

"Diet breadth as reflected by faunal remains should be relatively narrow at early Classic Thule sites and relatively high at Modified Thule and early Historic sites."

No detailed excavations of Classic Thule sites were undertaken in the northern part of the study area since both McCartney (1979a) and Taylor and McGhee (1979) had previously conducted extensive excavations in the Creswell Bay area, and Ramsden (1981) had conducted excavations on Prince of Wales Island adjacent to the Aston Bay area. Time and logistical constraints (i.e. extensive foot-based surveys) also precluded intensive excavations. However, during the survey all visible whale bone was recorded (or at least estimated), and serves as an additional comparative base.

The use of whale bone as structural material in Thule dwellings (see Plate 7a) has tended to restrict analysis of contained faunal materials, given the difficulty in distinguishing between structural and subsistence related remains. In this regard, the question of bowhead whale hunting vs. bowhead whale bone utilization has been previously discussed. The implication was advanced that, if the latter occurred, then "culled" whale bone elements present at Thule dwelling sites should be correspondingly underrepresented at "beached whale" locations, while elements at the latter sites should be underrepresented at dwelling sites.

Bowhead elements at the various "beached whale" locations and residential sites in Creswell and Aston Bays are presented in Table 11, and comparisons between locations and dwellings excavated by McCartney (1979a) represented in Figure 112. The element distribution is characteristic of a "whale hunting" as opposed to a "bone collecting" pattern. That is, there is nothing approaching a 1:1 articulation of overrepresented elements with underrepresented elements between "beached whale" and residential sites. There is, however, considerable variation in mandibles and crania in relative elemental abundances between the two residential sites. Much of this variation may be due to whale bone removal by recent Inuit carvers (see especially McCartney 1979a) and/or, at least for crania from PeJr-1, subsequent removal for qarmang construction at nearby PeJr-2 (McCartney 1978).

Two additional aspects of the bowhead whale bone in the study area lend additional support to the characterization of Classic Thule Eskimos on Somerset Island as active whale hunters. First, based on a series of measurements on 197 crania, 327 mandibles, 47 cervical vertebrae, and 110 scapulae, McCartney (1978) estimated that almost all (97%) of the bowhead whales represented in the sample were immature and between 3-6.5 metres in length (adult bowheads average 10-12 metres in length), suggesting deliberate selection of younger animals. Historically, and during recent times, Alaskan Eskimos selected smaller whales over mature whales, since the former were less dangerous to hunt, "tasted better", and were easier to tow to shore (see e.g. Rainey 1947:26; Laughlin 1963:76; McVay 1973:28; Bisset 1976:106; Worl 1980:308; McCartney 1984).

Second, of the 96 bowhead whale crania recorded during the present

Table 11. Summary of Bowhead Whale Bone Elements at Creswell Bay and Aston Bay, Somerset Island.

1. Creswell Bay: Locations, Field Camps, Spring-Fall Residential Sites.

Site	Crania	Mandibles	Maxillae	Cervical Vertebrae	Vertebrae	Ribs	Scapulae
B-1	3				4		
80-44		2					
80-45	2				1	1	
80-46						1	
80-48					1		
B-2					3		
B-3		2	2		2	4	1
B-4		2			1		
80-49		2	2		2	2	
80-50b		2	1		2	1	
80-50c	2						
80-51a	1	2	1				
80-52		1			1		
B-7	1						
80-53	5						

Table 11. Continued.

Site	Crania	Mandibles	Maxillae	Cervical Vertebrae	Vertebrae	Ribs	Scapulae
80-54		1					
80-55a	1	2			10		
80-55b	1						
80-55c	1						
80-56					7	2	
B-8	1						
80-60	2						
80-60a					21		
80-62		4	2		2		
80-63					10e	10e	
B-9	1						
80-64	1						
80-65					2		
B-10	1						
B-11	1						
80-75	1						
80-76					2		

Table 11. Continued

Site	Crania	Mandibles	Maxillae	Cervical Vertebrae	Vertebrae	Ribs	Scapulae
80-80					9		
80-80c					2		
80-81	1						
80-81a					2		
B-12	1	1					
80-82					1		
80-83				1	10e		
B-12	4	3					
B-13	1						
B-14	3		2		5e	5e	
80-85		1			5e	5e	
80-88	10						
80-89	9						
B-15	4						
80-90	1				10e		
80-92a-c	53	5e			30e	10e	
80-102						3	
80-105						3	
80-110a	3				10e	10e	
80-110b	6				10e	10e	

Table 11. Continued

2. Aston Bay: Locations, Field Camps, Spring-Fall Residential Sites.

Site	Crania	Mandibles	Maxillae	Cervical Vertebrae	Vertebrae	Ribs	Scapulae
80-126a					1		
80-B-20	1				1		
80-128						1	
80-132					1		
80-135	5	3			20		
80-140						2	
B-21	1						
80-146		2			10e		
80-147		1				1	
B-22	1						
B-23	1						

Table 11. Continued.

3. Creswell Bay: Excavated Semisubterranean Dwelling Sites (Data from McCartney 1978, 1979a)

Site	Crania	Mandibles	Maxillae	Cervical Vertebrae	Vertebrae	Ribs	Scapulae
80-58 (total for 3 dwellings)	20	28	68	7	52	184	18
PeJr-1 (total for 4 dwellings)	4	119	107	4	37	101	5

Table 11. Continued.

4. Creswell Bay: Total Surface and Visible Imbedded Major Whale Bone Elements of Residential Sites (Primarily From McCartney 1978, 1979a; Secondarily From This Study).

Site	Crania	Mandibles	Maxillae	Cervical Vertebrae	Vertebrae	Ribs	Scapulae
80-58*	78	97	169	7	85	292	24
80-86	49	63	?	3	?	?	13
80-93	23	?	?	?	?	?	?
80-96	22	114	?	?	?	?	1
80-111	12	20	?	?	?	?	6
PeJr-1	12	216	189	4	73	550	78
PeJr-2**	86	46	?	33	?	"few"?	0
PeJq-1*	31	251	?	?	?	?	11

* Includes totals from excavations (see Table 11.3 above)

** Includes 15 crania in a late Historic qarmang

Table 11. Continued.

5. Aston Bay: Bowhead Whale MNI at Residential Sites Based on Element Indicated.

Site	Crania	Mandibles	Maxillae	Cervical Vertebrae	Vertebrae	Ribs	Scapulae
80-126		1					
80-130	1						
80-134	4						
80-136	7						
80-149		1					
80-164a		1					

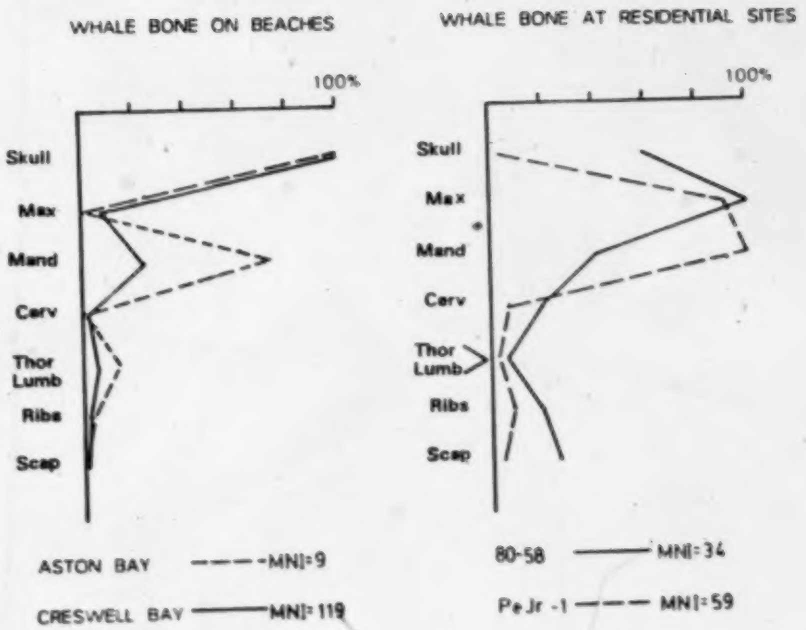


Figure 112. Comparison of relative bowhead whale bone element frequencies (as percent MNI) from semi-subterranean dwelling sites and bowhead whale processing locations. Data for dwelling sites from McCartney 1978 and 1979.

study in which the base of the occipital bone was visible, 94 or 98% exhibit cultural modification in the form of a hole immediately anterior of the foramen magnum (Plate 10a). McCartney (1980) was the first to report on this modification, and suggested it to be the result of brain extraction or symbolic "releasing" of the whales' souls.

While this evidence (plus that discussed elsewhere in the present study) strongly supports the interpretation of Thule Eskimos on Somerset Island as active whale hunters, the determination of the importance of bowhead whales to the subsistence economy at the individual dwelling level is restricted by the dual structure-diet role, since structural material may be acquired from previously abandoned and/or rebuilt dwellings at the site as well as from old beached carcasses. Furthermore, as suggested previously, high status community members (e.g. whaling crew leaders) may, as an indication of their status, have acquired proportionately more structural whale bone than other community members.

At the site level, however, the structure vs. diet distinction is not as restrictive, since the total whale bone removed from processing sites to residential sites must bear some relation to the total number of whales actually obtained during the period of site occupation. Accordingly, in the following analysis the average minimum number of individuals for bowhead whales per dwelling/per site is used as an approximation of the relative abundance of harvested individuals. In addition, and following Rick (1980) and Staab (1979), the potential edible portion of land mammals is taken to be 50%, and for sea mammals 70%. Fish and fowl are estimated at 75%. Assuming approximately similar occupation spans for both Creswell Bay and Aston Bay, the decrease in the importance of bowhead whales from early Classic to late Classic is pronounced (see Figure 113). The value of 4.5 for the northern Creswell Bay qarmang site (PeJr-2) is apparently artificially high, in that it is based on bowhead whale elements (primarily crania and mandibles) which were probably obtained from sites PeJr-1 and PeJq-1 following their abandonment (McCartney 1978). Furthermore, although the MNI for other fauna at the Creswell Bay Learmonth site (PeJr-1) is not given by Taylor and McGhee (1979), relative proportions of elements of individual species, while not accounting for culling or larger species, nevertheless suggest an increase in diet breadth from the early Classic Thule occupation to the terminal occupational phase (Figure 114), which can be expected to approximate the beginning of the late Classic Thule phase.

In the southern region, early Classic Thule winter dwellings were excavated at Sherman Inlet (site 82-11) and at northern Thom Bay (site 81-80); late Classic Thule sites at Malerualik (site 81-61) on the Simpson Strait narrows, Tulloch Point immediately west of Douglas Bay (site 81-52), Gladman Point on the western extreme of Simpson Strait (site 81-73), and at the Netsilik River (site 82-17); Modified Thule-early Historic tent rings were excavated at Netsilik Lake (site 82-24), Netsilik River (sites 82-20, 82-21), Felix Harbour (site 82-50), Victoria Harbour (site 82-70), Sheriff Harbour (site 82-57); an early Historic snow dwelling site (site 82-48) at Felix Harbour; two Classic Thule caches at Malerualik (site 81-61) and Modified Thule-early Historic caches at Douglas Bay (site 81-26) and Netsilik Lake (site 82-24). Results of the faunal analyses are summarized in

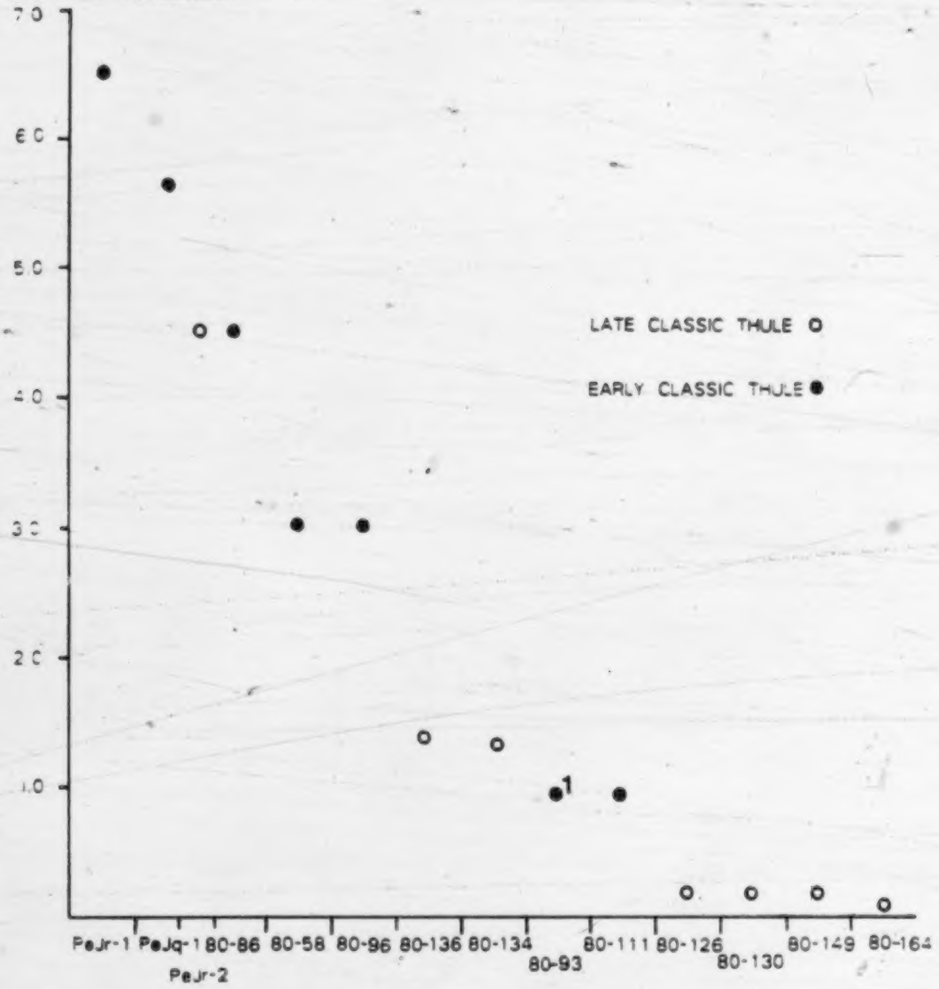


Figure 113. Comparison of bowhead whale MNI/semisubterranean dwelling number for early and late Classic Thule sites on Somerset Island. 1 - Site badly disturbed. Clarke (1979) estimates recent removal of 150 bowhead whale crania.

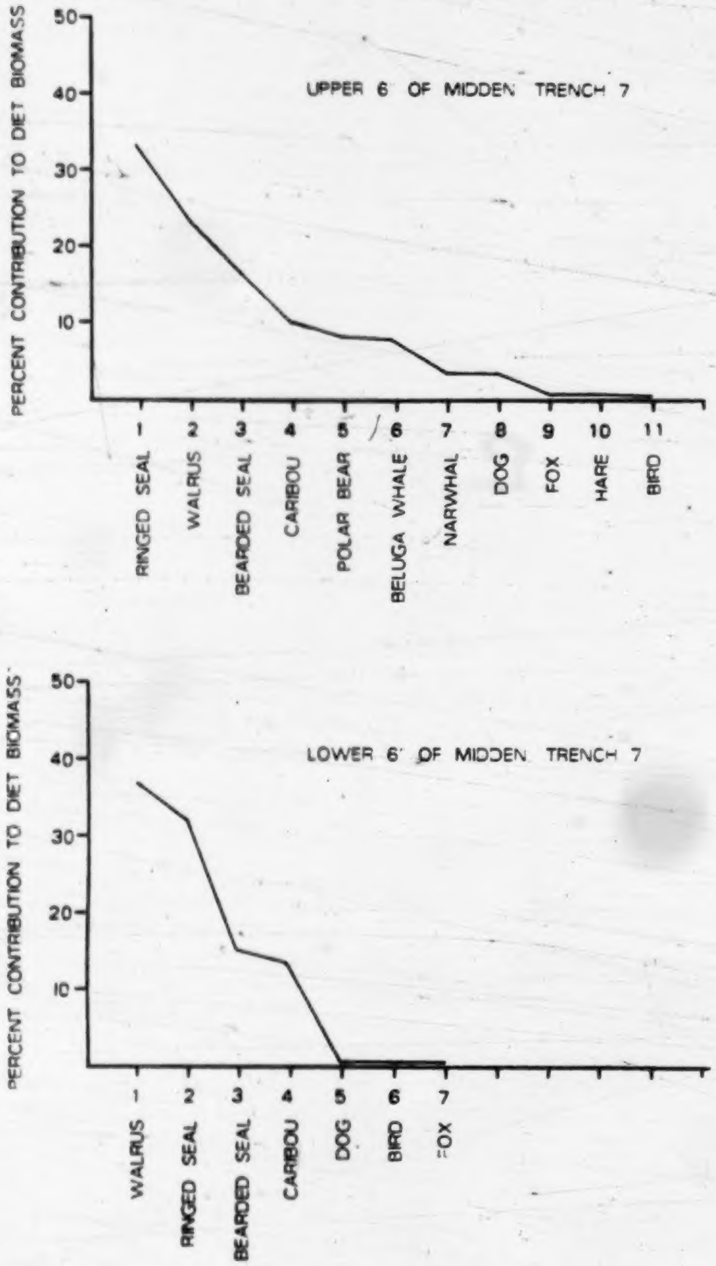


Figure 114. Percent contribution by weight to diet of fauna represented in trench 7 excavation at PeJr-1, described in Taylor and McGhee (1979).

Tables 12 and 13.

In the King William Island area, there is a pronounced trend toward increasing diet breadth as reflected at winter residential sites from early to late Classic Thule (Figure 115). Continuation of the trend throughout the Modified Thule and early Historic period is difficult to determine, since only spring-fall camps were recognized in the area. However, the early Historic period subsistence patterns in this region as described by Schwatka (Stackpole 1965) and Amundsen (1908) closely approach what Binford (1980) describes as a "serial" foraging strategy, in which different resources are consecutively "phased in" as they become available although there is still an emphasis on a generalist strategy.

In the Lord May Bay-Netsilik Lake area, the trend is essentially the opposite, with the only early Classic Thule site (Thom Bay) exhibiting a relatively wide diet breadth, while the late Classic Thule site at the Netsilik River exhibits a narrower diet breadth (Figure 116). The early Historic pattern for the southern area, similar to that in the King William Island area, and as described by Ross (1835), Rasmussen (1931) and Balikci (1964, 1970, 1984), is characteristic of a 'serial' foraging strategy, and the remains associated with the excavated tent ring sites and the single snow dwelling site are consistent with this characterization (Figure 117). Accordingly, the overall diet breadth has not changed significantly in relation to that associated with early Classic Thule occupations in the area.

Table 12. Summary of Fauna MNI from Excavated and/or Tested Classic Thule Semisubterranean Dwelling Sites.

Site	Site type	Caribou	Muskox	Canid.	Fox	Hare	Polar Bear	Small Whale	Bearded Seal	Ringed Seal	Fish	Swan	Goose	Duck or Other Smaller Bird
82-11	Excavated Dwelling	15		1	2					2			3	2
81-52	Test Pits	5		2	1	1				2			10	
81-61	Excavated[1] Dwelling	23		3	3		1			5	1	3	67	2
81-73	Test[2] Pit	2	1										1	
81-80	Excavated Dwelling	3	1	1	2	2				10	8		1	1
82-87	Test Pits	2			5		1			5	4			2
82-17	Excavated	25		1	1					1	2		1	2

1 - does not include bowhead whale bone fragments or structural material (3 at 81-61, 6 at 81-80)

2 - sample taken from 1 test pit primarily for dating purposes; site not included in comparisons

Table 13. Summary of Fauna MNI from excavated Late Historic Sites.

Site	Site Type	Caribou	Muskox	Canid	Fox	Hare	Polar Bear	Small Whale	Bearded Seal	Ringed Seal	Fish	Swan	Goose	Duck or Other Smaller Bird
81-81	2 *Qarmang*	1			8			1	1	15			1	1
82-45	2 Snow Dwellings	2			3					1				
82-17a	1 Tent Ring	2												
82-19	1 Tent Ring	1												

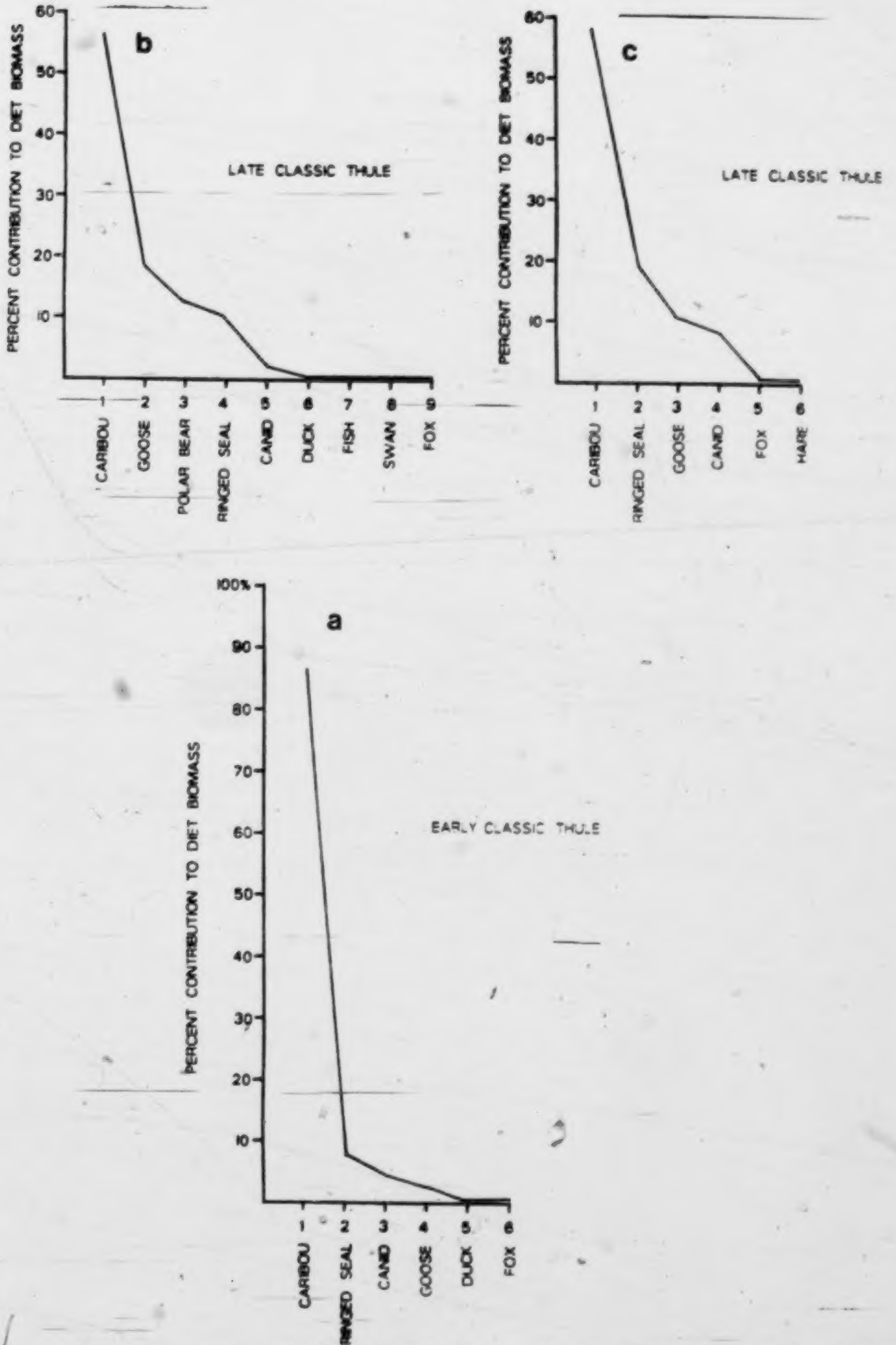


Figure 115. Percent contribution by weight to diet of fauna represented at a) the early Classic Thule site 82-11 at Sherman Inlet, and the late Classic Thule sites b) 81-61, and c) 81-52, both on King William Island.

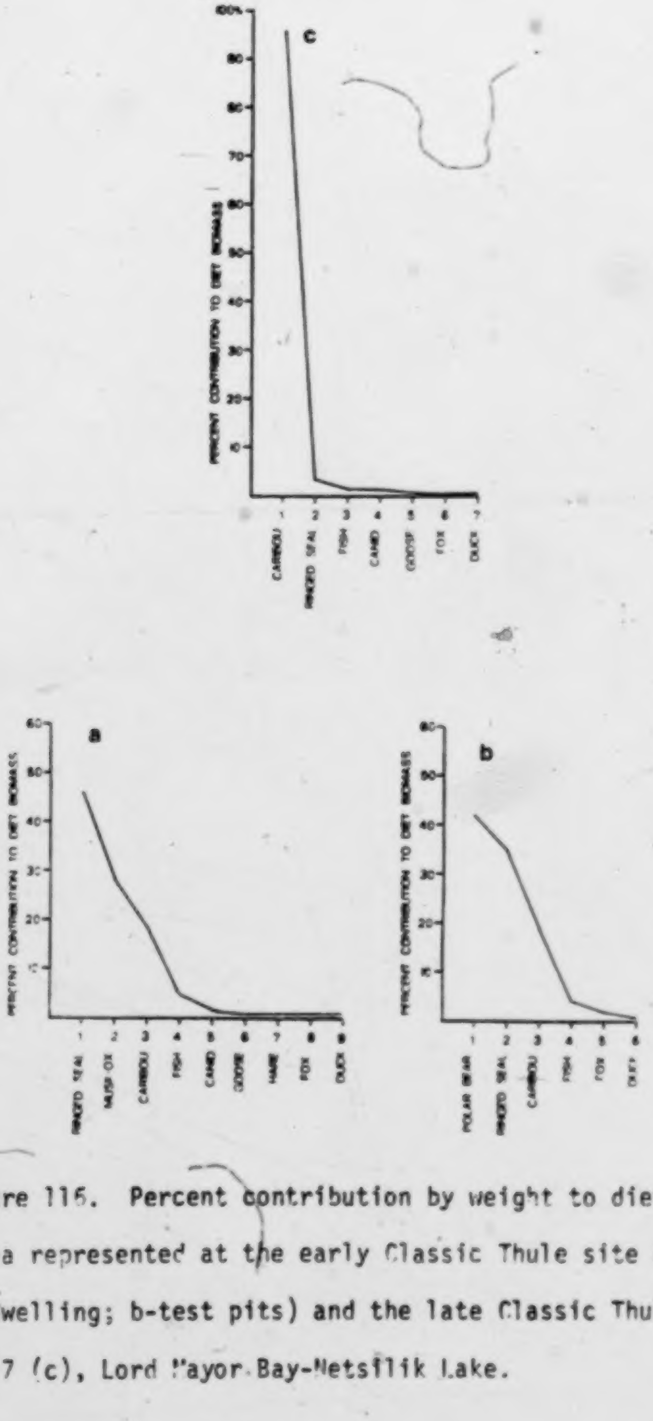


Figure 115. Percent contribution by weight to diet of fauna represented at the early Classic Thule site 81 [illegible] (a-dwelling; b-test pits) and the late Classic Thule site 82-17 (c), Lord Mayor Bay-Netsilik Lake.

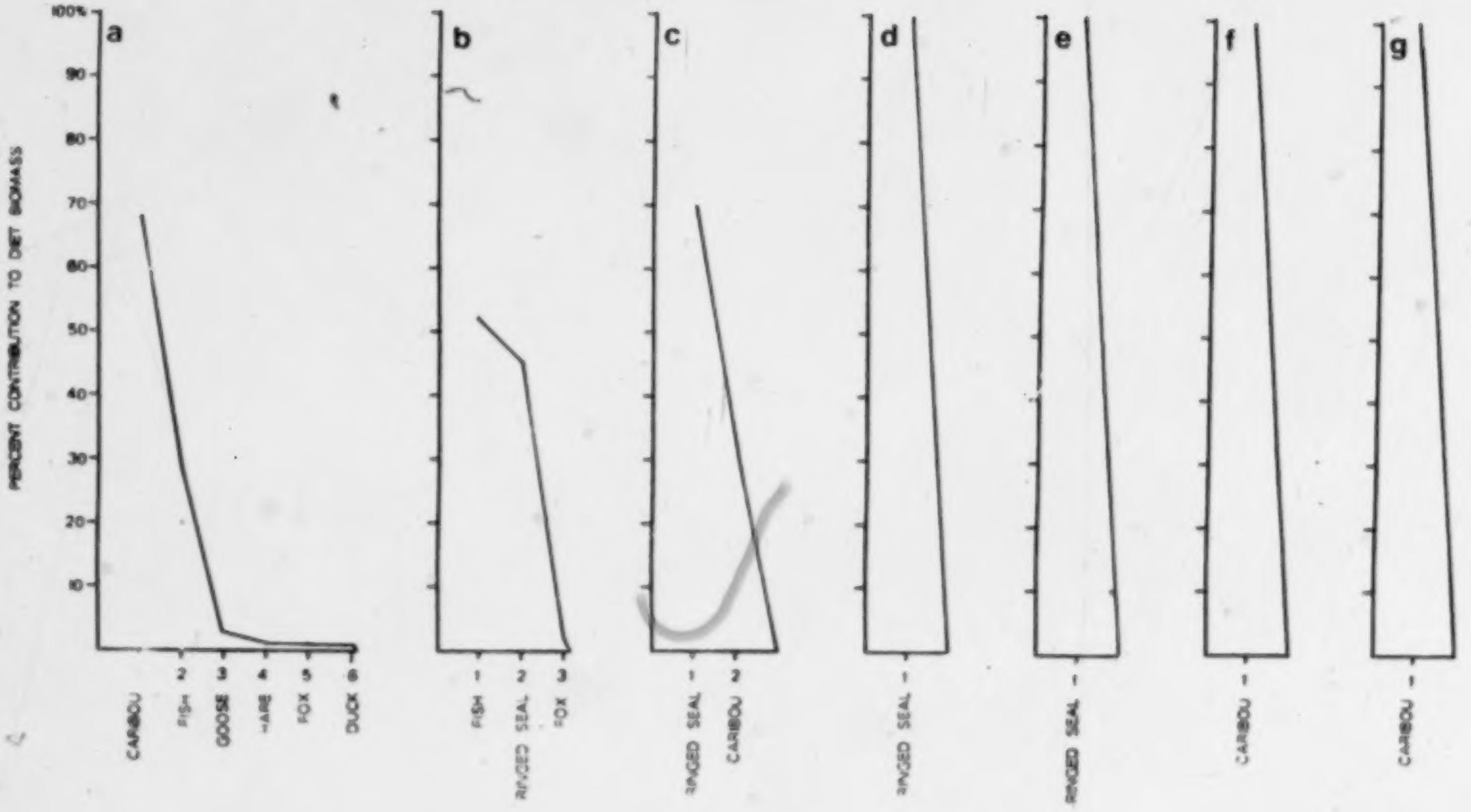


Figure 117. Percent contribution by weight to diet of fauna represented at the Modified Thule-early Historic sites a)82-24, heavy tent ring, b) 82-57, four tent rings, c) 82-48, three snow dwelling features, d) 82-70, three tent rings, e) 82-50, two tent rings, f) 82-21, one tent ring, and g) 82-22, two tent rings.

Test Implication 9

> "High-bulk resources at residential sites should show greater culling of low utility elements at Classic Thule sites and less at Modified Thule and Historic sites. Locations and caches should show progressively greater culling of high and medium utility elements for transfer to residential sites."

Since individual bone element abundances or proportions are not available for the northern whaling region, the analysis is restricted to the southern caribou region.

Relative proportions of caribou bone elements from excavated residential dwellings, utilizing the method suggested by Binford (1978a:69-72) to compare culling strategies, are represented in Figures 118 and 119. Although the patterns are remarkably similar for the early and late Classic Thule sites in the King William Island area, there are nevertheless several important distinguishing features. In particular, the greatest differences in relative proportions of elements are in skulls, distal humerii, proximal radio-ulnae, and proximal metacarpals, all of which are overrepresented in the late Classic Thule assemblage, and which rank 21st, 11th, 18th, and 17th respectively (from a total of 27) in general utility according to Binford (1978a:74). This would certainly seem to support the suggestion of differential culling of caribou between early and late Classic Thule, with the more radical culling characteristic of the former.

The pattern for the Lord Mayor Bay area is difficult to determine, since two of the three sites excavated yielded relatively small numbers of caribou (Thom Bay 2.5 and Netsilik Lake 3.0 vs. 22.5 for

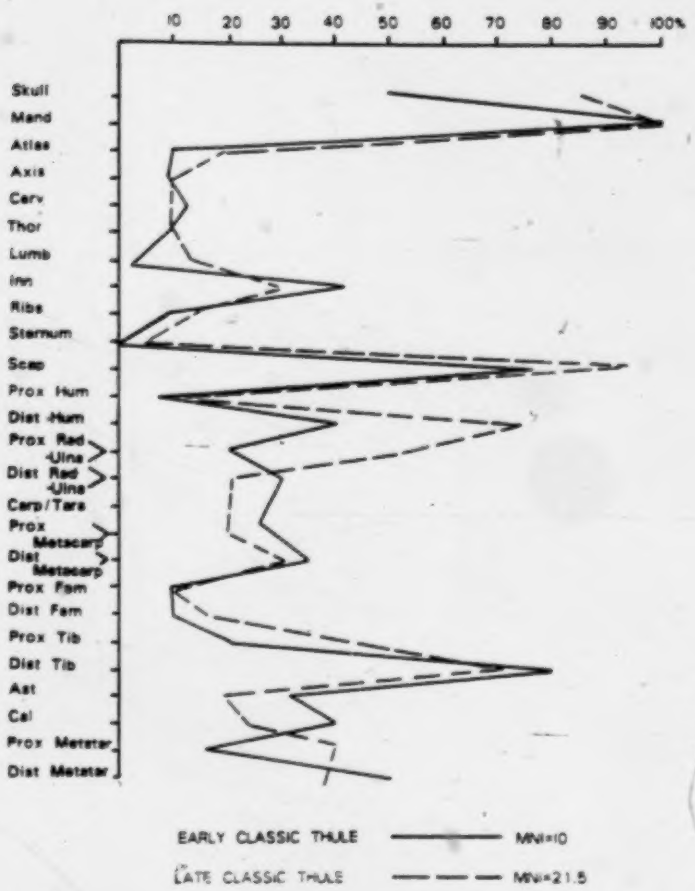


Figure 118. Relative elemental abundances for caribou from complete dwelling and midden excavations at the early Classic Thule component at site 82-11 at Sherman Inlet and the late Classic Thule component at site 81-61 on King William Island.

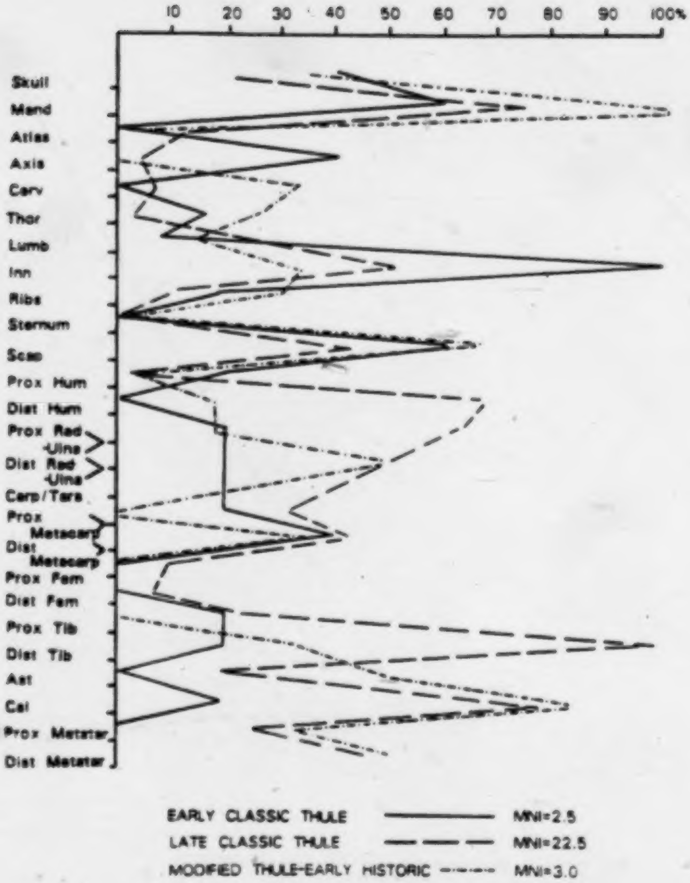


Figure 119. Relative elemental abundances for caribou from complete dwelling and midden excavations at the early Classic Thule component at site 81-80 in the Lord Mayor Bay area, the late Classic Thule site 82-17, and the early Historic site 82-24, both in the Netsilik Lake area.

the late Classic Thule site at the Netsilik River). Consequently, little more can be suggested than that the individual patterns are generally consistent with residential site patterns noted elsewhere (compare with Figure 32 and Binford 1978a:327,397).

Of the four undisturbed or apparently minimally disturbed caches excavated during the study, all contained exclusively caribou bone, of which relative elemental abundances are represented in Figures 120 and 121. The long bone distal and proximal ends associated with the Malerualik caches occurred together with a number of long bone fragments, and appear to relate to tent-based occupations prior to the construction of the caches, as suggested by the cache forms. That is, following the abandonment of tents at the locality, the resulting tent ring stones were utilized in the construction of caches. A similar utilization sequence was observed during the ethnoarchaeological studies associated with the present study (see Plate 12a and b). There is nevertheless still a definite trend toward the storage of a narrower range of elements in the Modified Thule and early Historic period caches. In particular, there is a greater proportion of "middle" ranked elements (scapulae, pelves, and lumbar and thoracic vertebrae units, ranked 6th, 9th, 8th and 13th respectively by Binford 1978a:74) in the Classic Thule caches, whereas there is a greater proportion of 'lower' ranked elements (atlases and axes, ranked 25th of 27th by Binford 1978a:74) in the Modified Thule and early Historic caches. Although a relatively small sample, the data nevertheless do suggest that "insurance" storage amongst Modified Thule and early Historic groups was more extreme, and that corresponding initial processing for caching units was also more extreme.

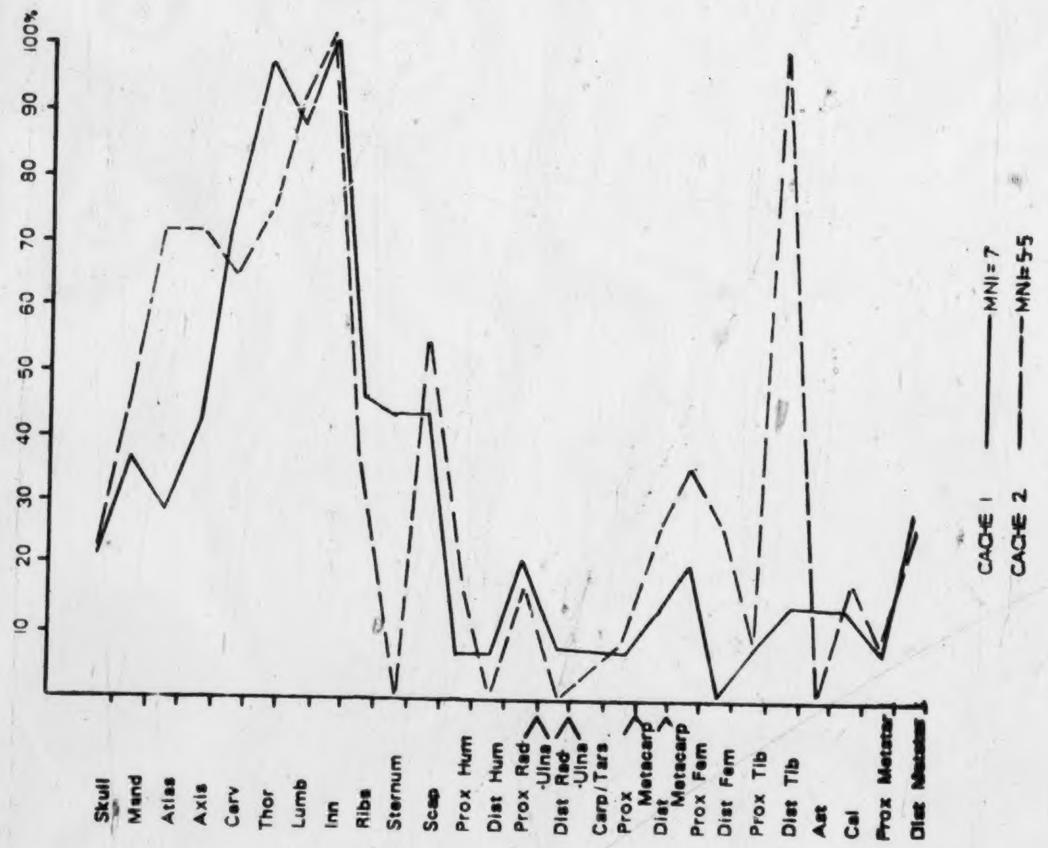


Figure 120. Relative elemental abundances for caribou from two caches excavated at the Classic Thule site 81-61, King William Island.

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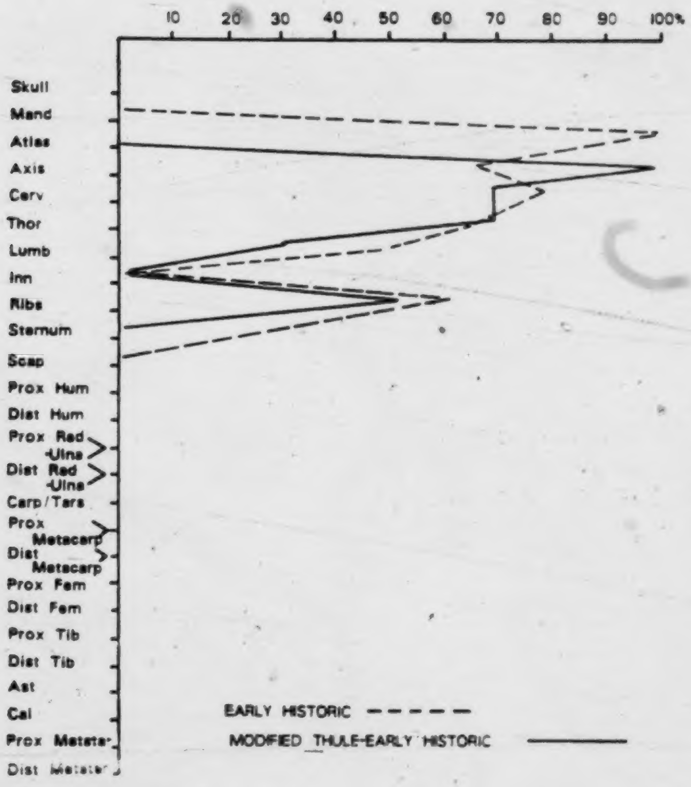

Figure 121. Relative elemental abundances for caribou from a Modified Thule-early Historic cache excavated at site 81-26, King William Island, and an early Historic cache excavated at site 82-24, Netsilik Lake.

Test Implication 10

> "Faunal remains at Classic Thule residential sites associated with high-bulk resources should indicate relatively extended seasonal occupations, while those at Modified Thule and early Historic residential sites should indicate relatively short seasonal occupations."

Determination of season of death for caribou and seal associated with early Classic Thule permanent or semipermanent winter residential dwellings and less permanent late Classic Thule winter residential dwellings are represented in Figures 122 and 123. Not surprisingly, almost all caribou teeth processed represent primarily fall, and secondarily summer, kills. The only exception to this pattern is a single individual from the Sherman Inlet early Classic site interpreted as a spring kill. Processed seal teeth, on the other hand, while few in number, represent primarily winter-spring kills, suggesting winter breathing-hole sealing techniques similar to Historic Central Inuit groups, but based out of terrestrially-based coastal locations. This differs markedly from the summer-fall open water techniques apparently favoured by Thule Eskimos further west in Coronation Gulf (Morrison 1983a, 1983b).

Comparison with the ethnographically documented Netsilik Inuit in the region who averaged a winter residential move every 30 days (Kelly 1983:180-181), clearly demonstrates the overall trend from multiseasonal to single season (or part season) occupations.

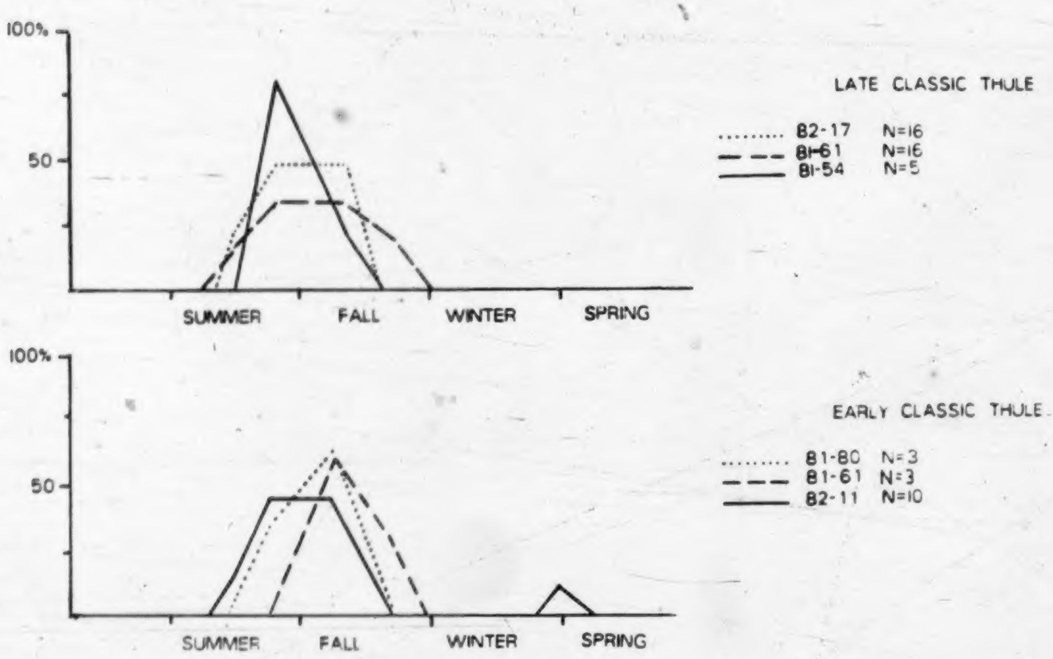

Figure 122. Summary of results of cementum analysis of caribou teeth from early and late Classic Thule sites in the southern part of the study area.

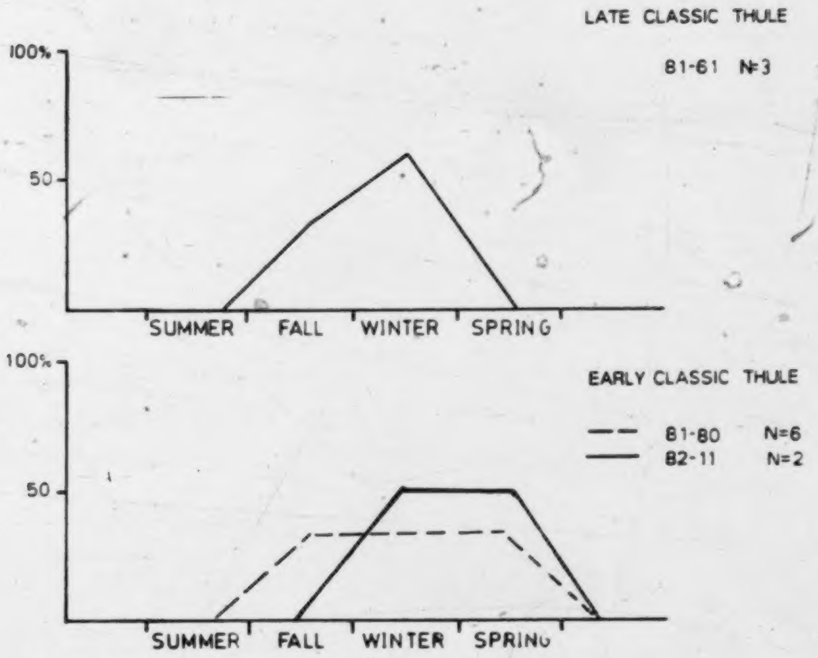

Figure 123. Summary of results of cementum and dentin analysis of ringed seal teeth from early and late Classic Thule sites in the southern part of the study area.

CHAPTER NINE:

HYPOTHESIS 2: TEST IMPLICATION RESULTS

HYPOTHESIS 2:

> The introduction of the rifle will be accompanied by a transformation of a subsistence-settlement system based on a foraging strategy to a subsistence-settlement system based on a collecting strategy, but one which lacks specialized procurement techniques.

Test Implication 1

> "There should be a greater functional separation of late Historic period sites into residential bases, "high-bulk" locations, field camps, caches and stations than during the preceding Modified Thule and early Historic periods."

Since a substantial, continuous occupation of Somerset Island did not take place during the Modified Thule/early Historic Period, the comparisons for this, and succeeding test implications will be restricted to the southern "caribou" area.

In both regions where Modified and early Historic period occupations were documented (that is, King William Island-Adelaide Peninsula and Lord Mayor Bay-Netsilik Lake), there is a clear trend toward an increase in logistically-related field camps and a corresponding decrease in residential sites, with the trend most pronounced in the King William Island-Adelaide Peninsula area (Figures 124 and 125). This trend is more readily apparent if frequencies of tent ring site size are compared (Figures 126 and 127), although again the trend is stongest in the King William Island-Adelaide Peninsula region. On the other hand, there is very little difference in high-bulk locations, while low-bulk locations show a slight increase in both areas.

Cache sites increase slightly in relative abundance in the Lord Mayor Bay region, but, opposite to the predicted trend, decrease substantially in the King William Island region. Similarly, if absolute cache site/component size (i.e. number of caches per site or component) is considered, there is a definite increase in the relative proportion of larger caches during the late Historic period in the Lord Mayor Bay area (Figure 129), but in the King William Island area there is a decrease (Figure 128).

Test Implication 2

> "Intersite variability should be relatively higher for late Historic period sites than for the preceding Modified Thule and early Historic sites."

Again assuming that increasing site variability is reflected in changes in cache/tent ring proportions with changes in site size, the predicted changes do not occur in either of the two southern survey areas. The late Historic proportions remain relatively unchanged in relation to Modified Thule-early Historic proportions in the Lord

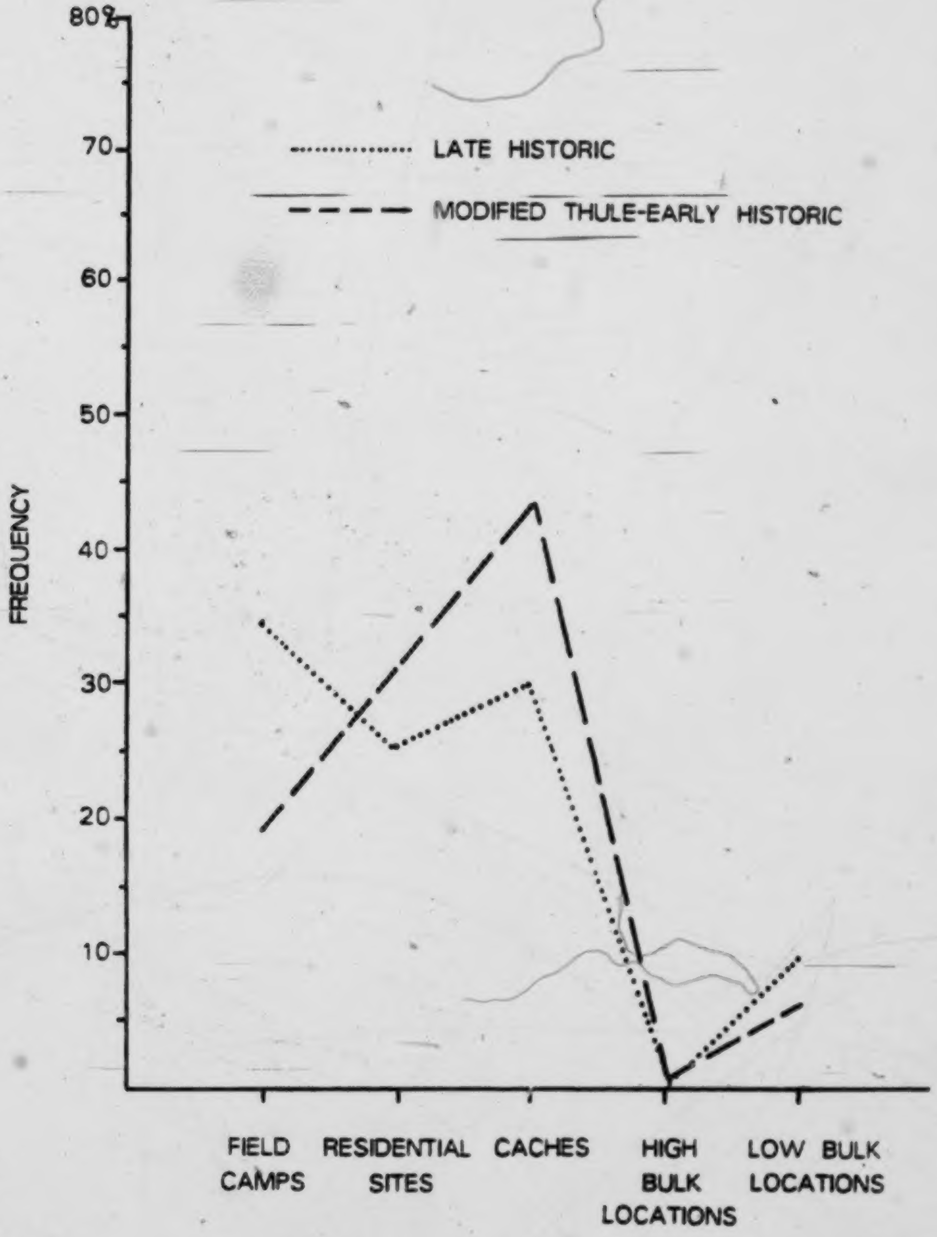

Figure 124. Comparison of Modified Thule-early Historic and late Historic site/component type frequencies in the King William Island-Adelaide Peninsula area.

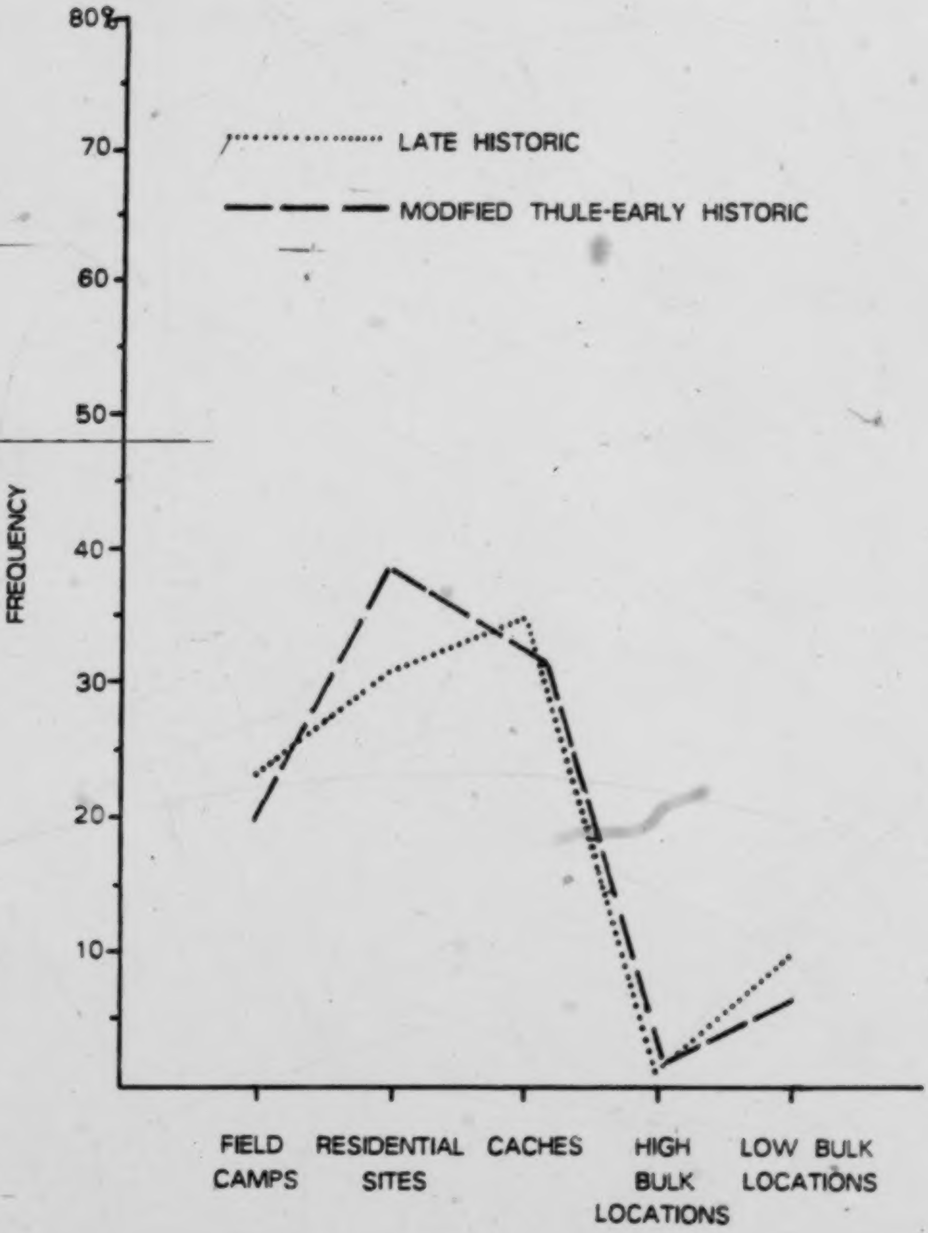

Figure 125. Comparison of Modified Thule-early Historic and late Historic site/component type frequencies in the Lord Mayor Bay-Netsilik Lake area.

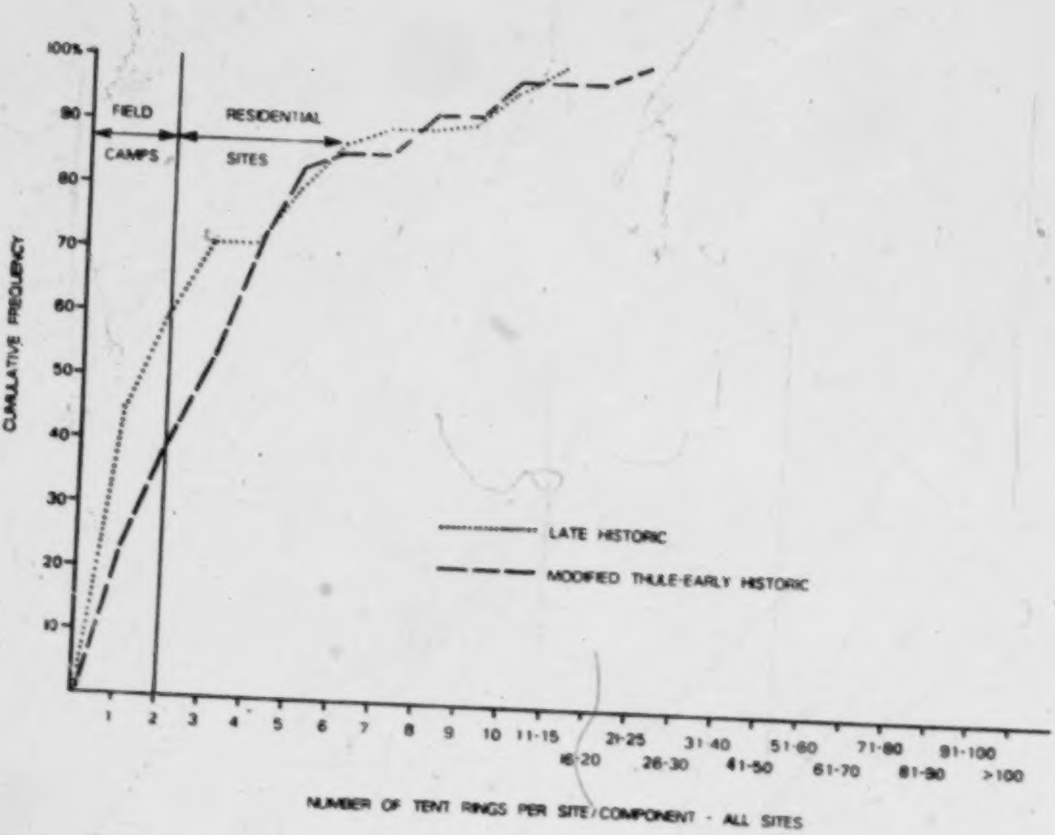

Figure 126. Comparison of frequencies of Modified Thule-early Historic and late Historic tent ring sites/components according to number of tent rings in the King William Island-Adelaide Peninsula region.

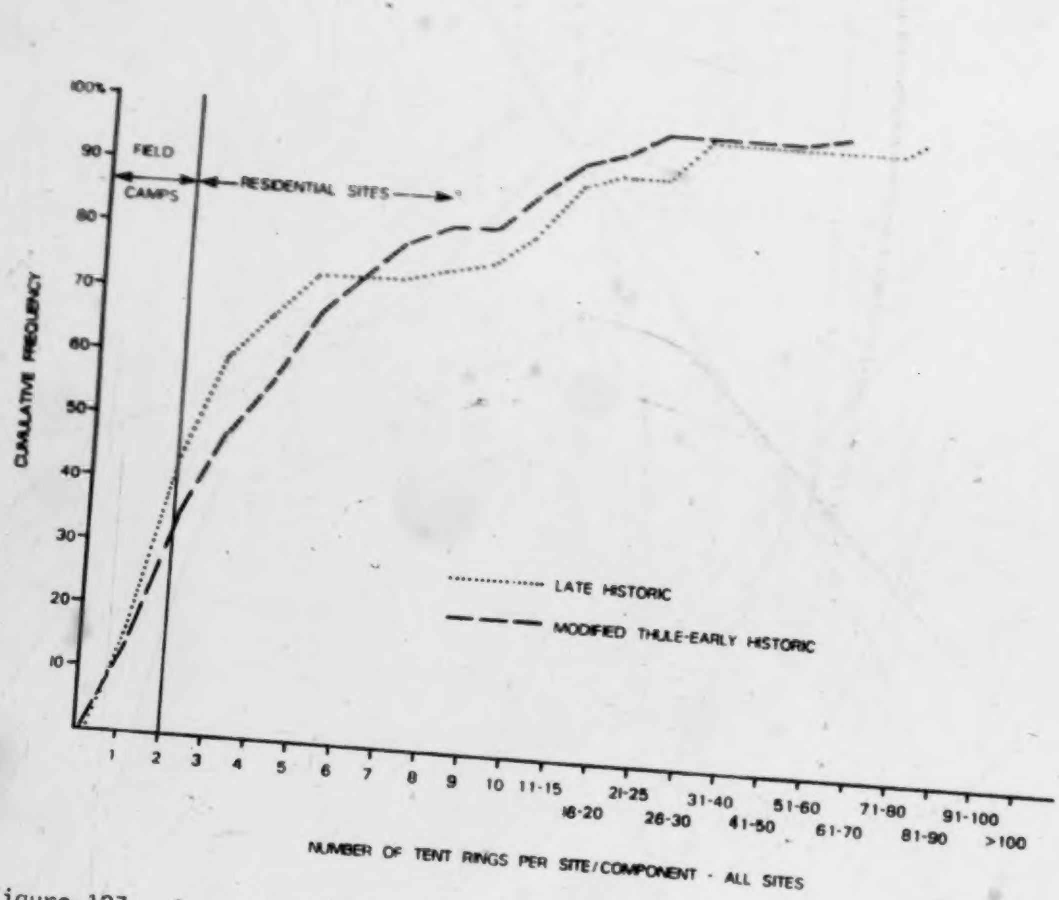

Figure 127. Comparison of frequencies of Modified Thule-early Historic and late Historic tent ring sites/components according to number of tent rings in the Lord Mayor Bay-Metsilik Lake region.

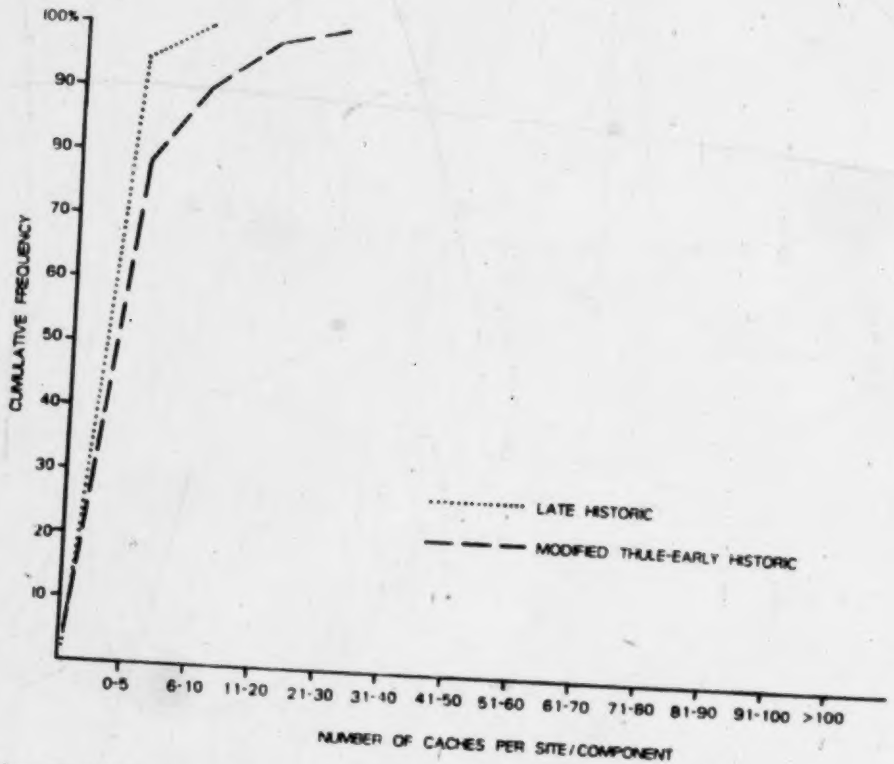

Figure 128. Comparison of frequencies of Modified Thule-early Historic and late Historic cache sites/components according to number of caches, in the King William Island-Adelaide Peninsula area.

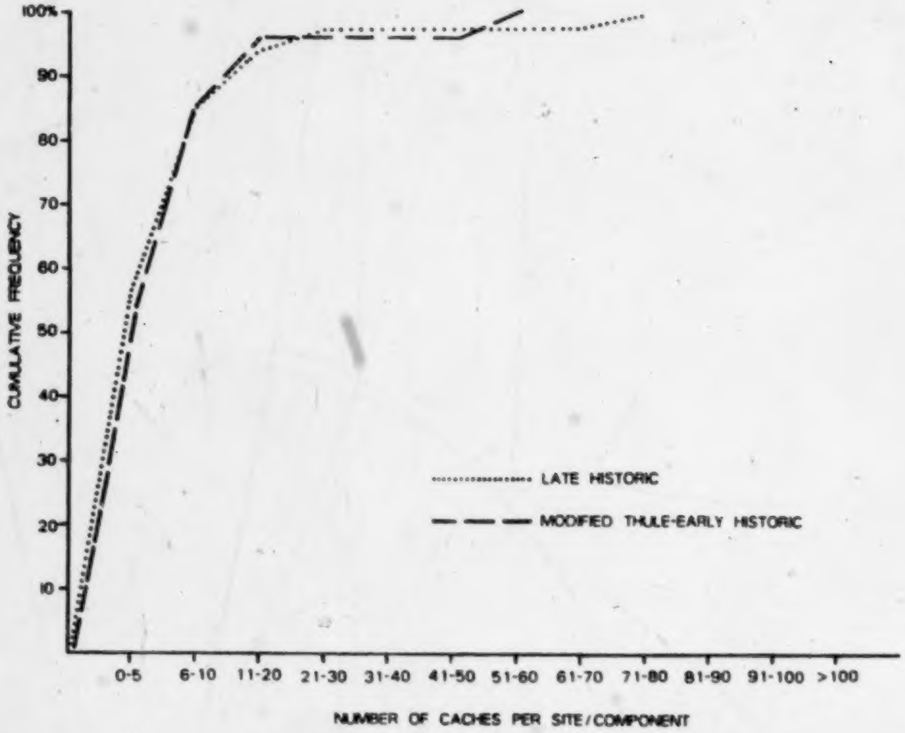

Figure 129. Comparison of frequencies of Modified Thule-early Historic and late Historic cache sites/components in the Lord Mayor Bay-Netsilik Lake area.

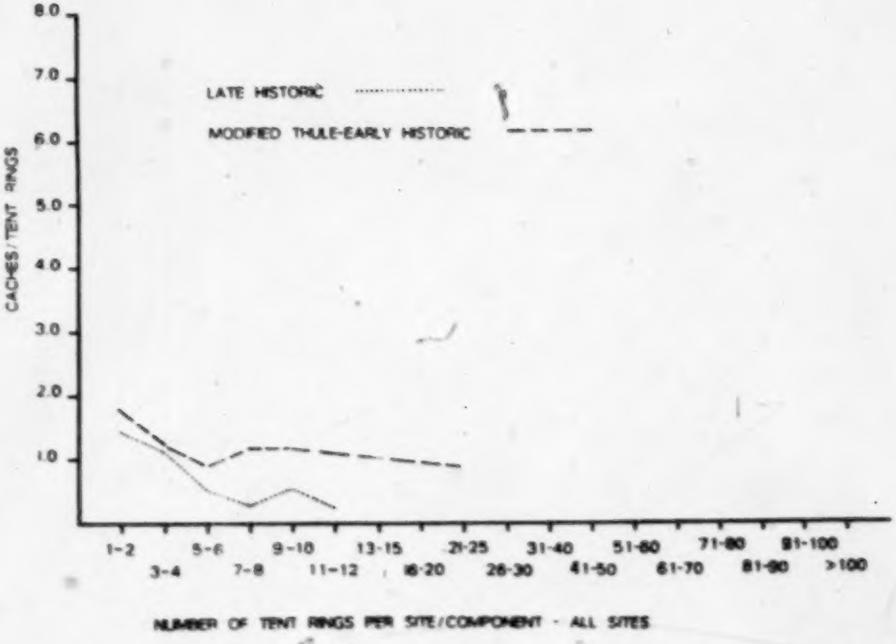

Figure 130. Comparison of average proportion of caches/tent rings according to number of tent rings for Modified Thule-early Historic and late Historic sites in the King William Island-Adelaide Peninsula area.

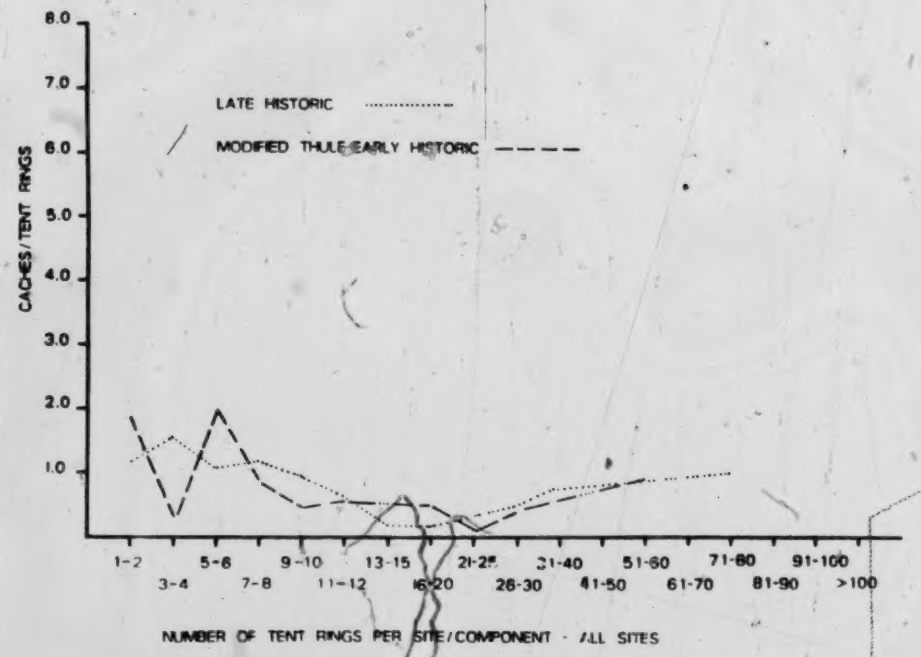

Figure 131. Comparison of average proportion of caches/tent rings according to number of tent rings for Modified Thule-early Historic and late Historic sites in the Lord Mayor Bay-Netsilik Lake area.

Mayor Bay-Netsilik Lake area (Figure 131), while for the King William Island-Adelaide Peninsula region the trend is toward decreasing proportion with increasing size (i.e. opposite to the predicted trend) (Figure 130).

Test Implication 3

> "There should be a trend from site patterns exhibiting a continuous series of foraging zones during the Modified Thule-early Historic period to site patterns exhibiting recognizable foraging and logistical zones during the late Historic period."

The Modified Thule-early Historic site pattern has been discussed previously, and the tendency toward continuous foraging radii demonstrated (see Figures 71 and 73). By contrast, there is a definite trend toward the development of logistical and discontinuous foraging radii in both areas where late Historic sites occur and in which continuous survey of segments of fifteen to twenty km or more occur (see Figures 132 and 133). Residential site concentrations are especially well developed in the Lord Mayor Bay area near Felix and Sheriff Harbours. These coastal concentrations, which also include late fall and winter features (*qarmang* and snow dwelling features), are consistent with Balikci's (1964) description of the post-rifle changes of the settlement patterns of Netsilik Inuit on Boothia Peninsula, which included a shift to coastal settlements to take advantage of inland caribou hunting during both summer and winter, and summer open water seal hunting.

Test Implication 4

"Late Historic site placement patterns should emphasize, and be related to, the primary critical resources of caribou, seal, and fox, as opposed to a more general pattern during the preceding Modified Thule and early Historic periods."

Site placement patterns during the Modified Thule-early Historic period have been discussed previously (see Chapter 8, test implication 4), where it was demonstrated that they tend to be oriented toward a "generalist" diet. While the late Historic period shows a definite trend toward an increased emphasis on sealing and fox trapping locations, there is a surprising lack of emphasis on settlement in primary caribou areas, and especially at caribou crossings (see Figures 46, 49 and 55). While several sites occur at the caribou crossings on King William Island, Sherman Inlet and Netsilik River, they do not approach the concentration or size that would be expected, given the ease with which caribou can be procured with a rifle at such locations.

Test Implication 5

"Late Historic residential sites should be relatively permanent or semipermanent and should show a greater association with "high-bulk" locations and caches than Modified Thule and early

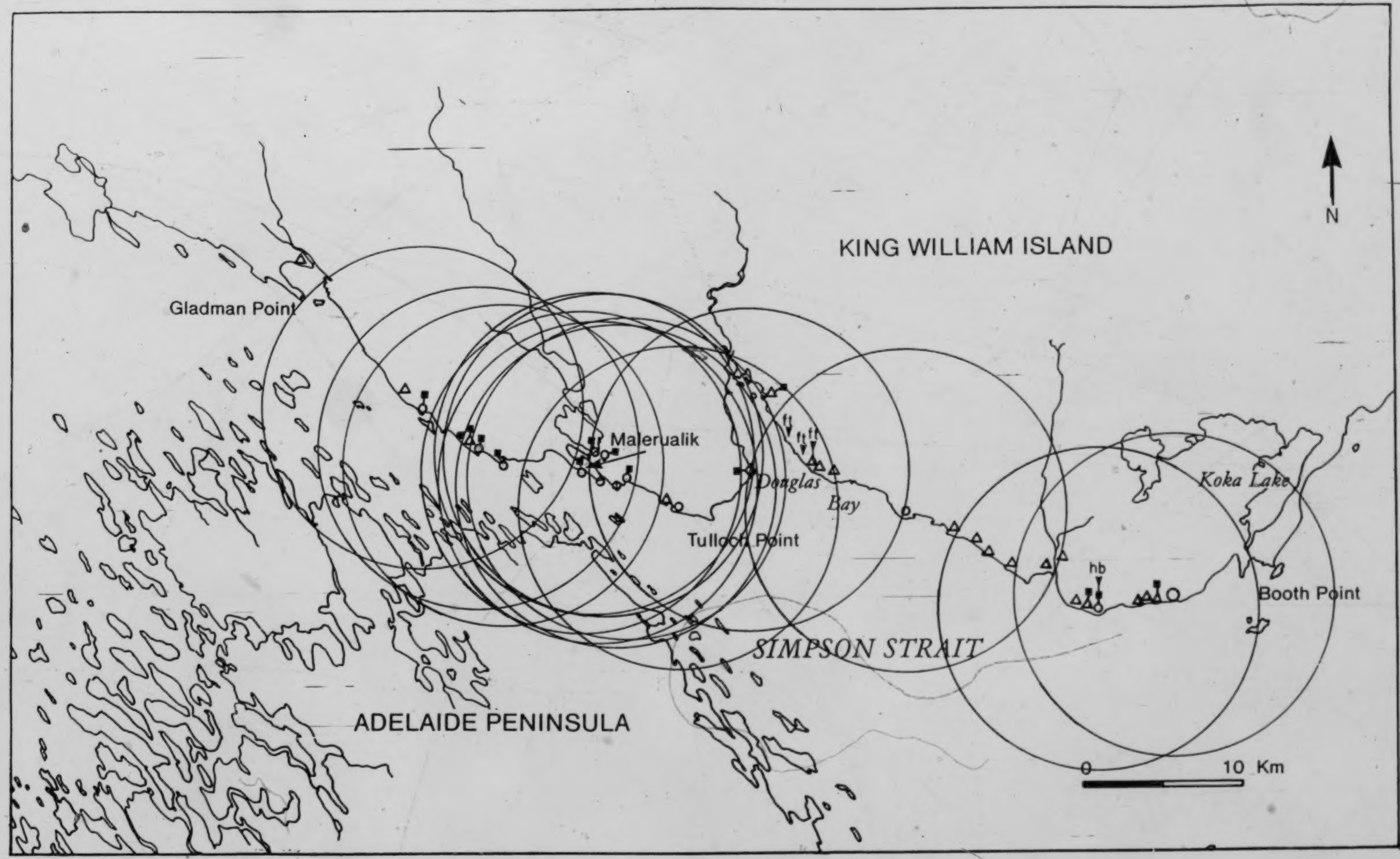
N
KING WILLIAM ISLAND
Gladman Point
Malerualik
Douglas
Bay
Tulloch Point
Koka Lake
hb
Booth Point
SIMPSON STRAIT
ADELAIDE PENINSULA
0
10 Km

Figure 132. Foraging zones associated with late Historic residential tent rings sites in the King William Island area.

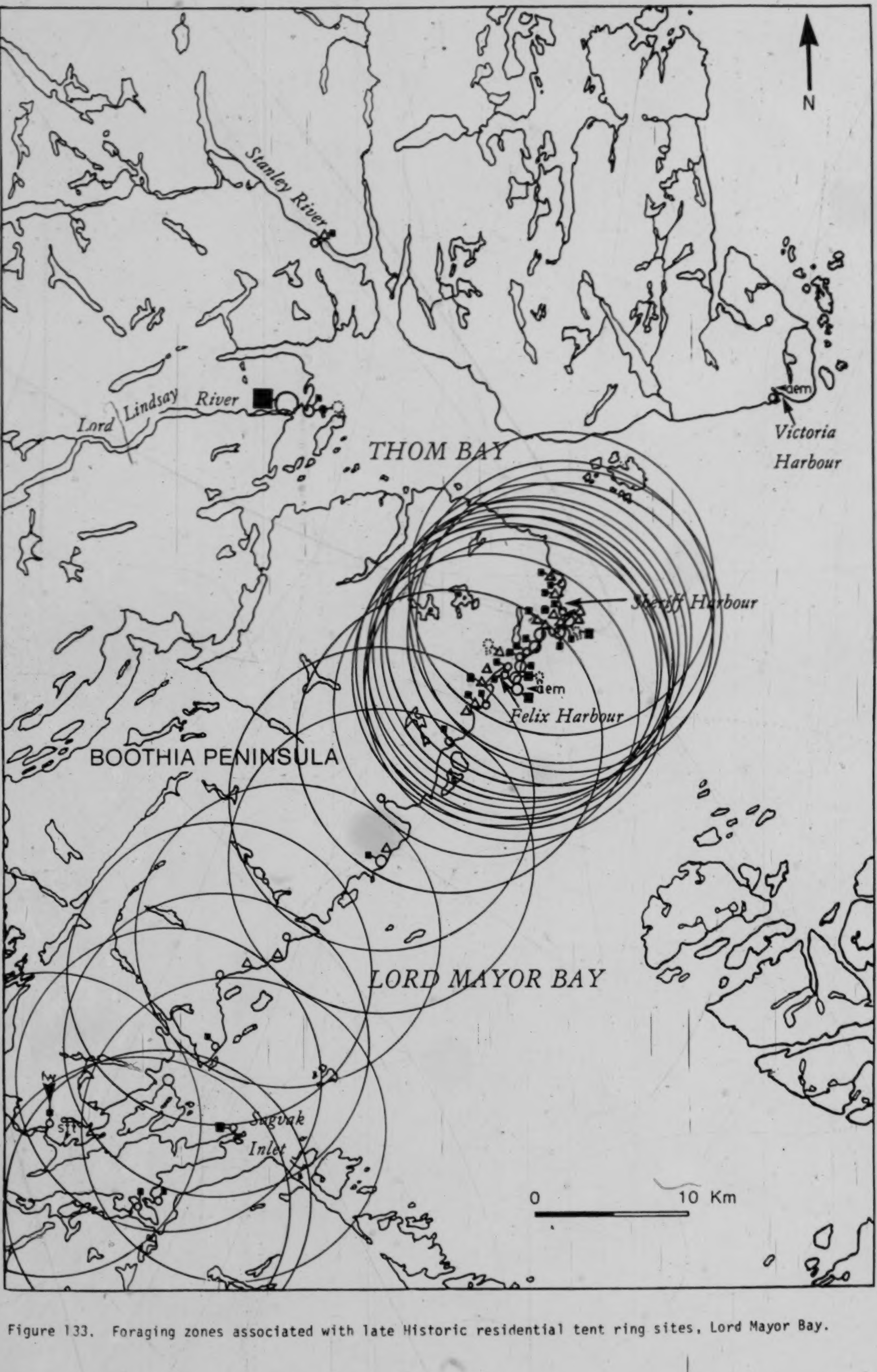
N
Stanley River
Lord Lindsay River
THOM BAY
dem
Victoria Harbour
Sheriff Harbour
dem
Felix Harbour
BOOTHIA PENINSULA
LORD MAYOR BAY
Sugvak Inlet
sit
0
10 Km

Figure 133. Foraging zones associated with late Historic residential tent ring sites, Lord Mayor Bay.

Historic sites."

The archaeological and historical evidence for temporary tent encampments for spring-fall occupations and temporary snow dwellings for winter occupations during the Modified Thule-early Historic period has been discussed previously. Although these forms were also the primary dwelling forms during the late Historic period (see e.g. Harrington 1952; Balikci 1964; Larsen 1967), the occurrence of qarmang at the mouth of the Lord Lindsay River in Thom Bay, although apparently an introduced form from elsewhere in the eastern Arctic, nevertheless suggests a developing trend toward at least semi-permanent dwelling forms.

Although few late Historic winter residential sites were recognized, the occurrence of the snow dwelling features and late fall qarmang at Felix and Sheriff Harbours and the Lord Lindsay River (all locations with large cache sites), suggests a tendency toward the location of winter residences at primary caching sites. During the early Historic period, and presumably, Modified Thule period, on the other hand, winter residential sites were located away from caching sites at primary winter sealing areas (see e.g. Figure 80).

Test Implication 6

"Internal site structure should remain relatively unchanged from the Modified Thule and early Historic period to the late Historic period."

Although only three winter residential sites were recorded in the southern area (all in the Lord Mayor Bay region), comparison of site plans of two of these (the third was not mapped in accurately) with those of early Historic winter residential sites (compare Figure 134 with Figure 101) suggests that internal site structure remained essentially unchanged (i.e. relatively "unstructured"). Similarly, large tent ring residential sites, as for both Classic Thule and Modified Thule-early Historic sites, exhibited patterns approaching 'random' (see e.g. Figure 135).

Test Implication 7

> "There should be a trend to increasing residential site size from the modified Thule and early Historic period to the late Historic period."

As demonstrated in Figures 136 and 137, there is a marked tendency toward generally larger residential tent ring site size in both the Lord Mayor Bay and King William Island regions, even though, at least in the King William Island area, the largest individual sites are of Modified Thule-early Historic affiliation. Sufficient data are not available to compare winter residential sites.

Test Implication 8

> "Diet breadth as reflected by faunal remains should be relatively narrow at late Historic sites in comparison with Modified

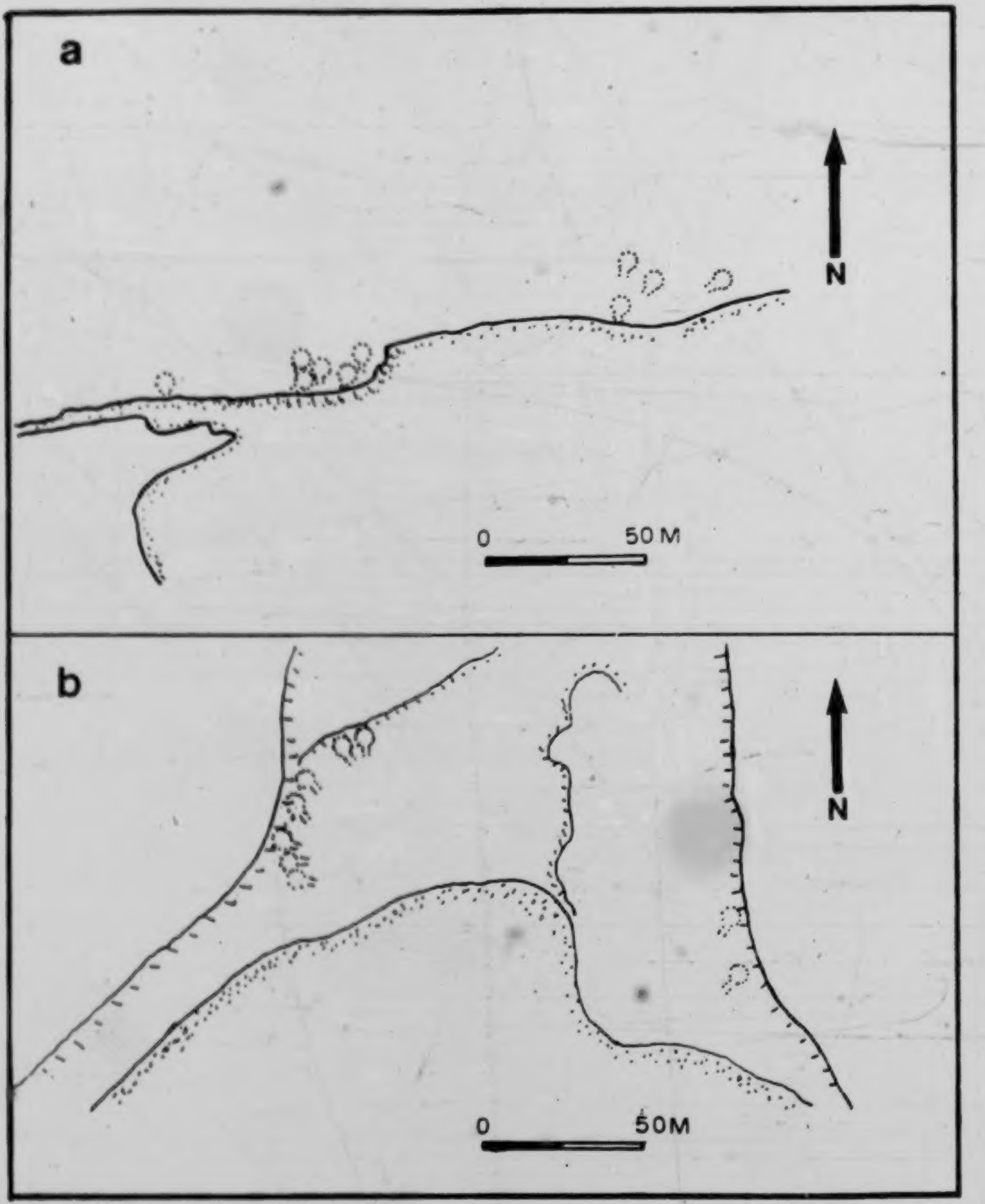
a
N
0
50 M
b
N
0
50M

Figure 134. Sketch of map of snow dwelling feature remains at the late Historic sites a) 82-45 and b) 82-47.

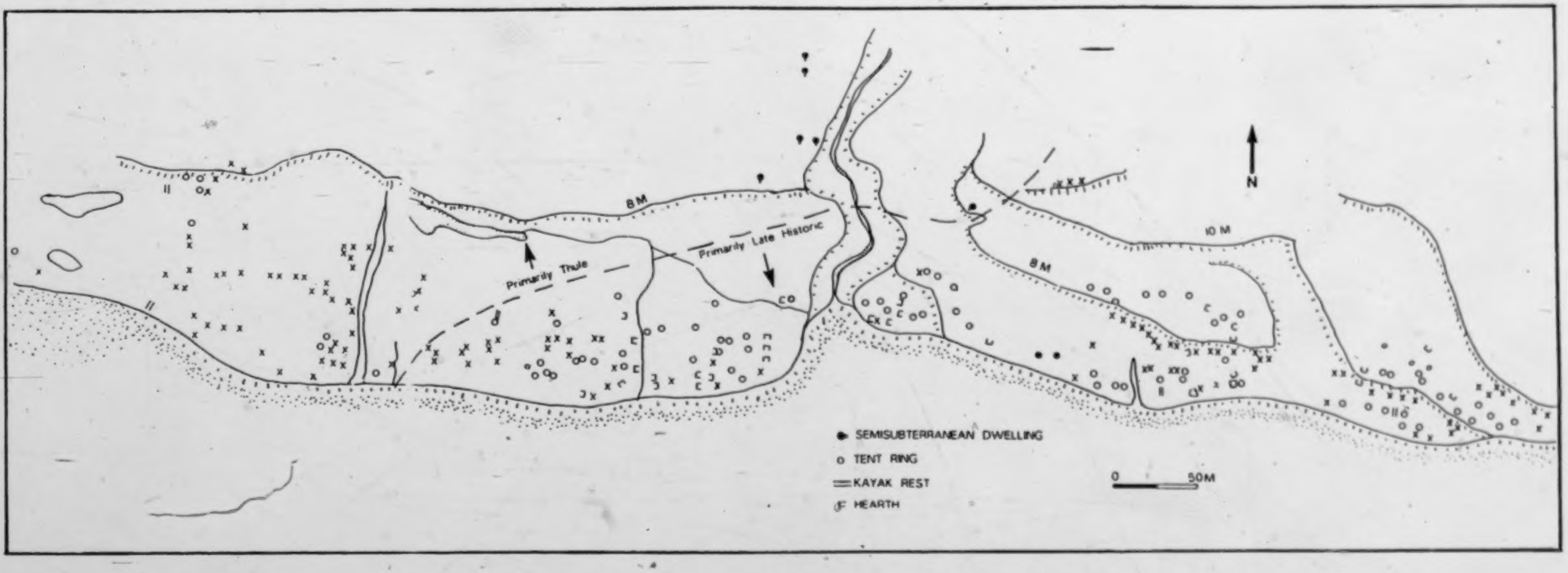
8 M
Primarily Thule
Primarily Late Historic
N
10 M
8 M
SEMISUBTERRANEAN DWELLING
TENT RING
KAYAK REST
HEARTH
0
50M

Figure 135. Sketch map of features at the predominantly late Historic site 81-80, Lord Mayor Bay area.

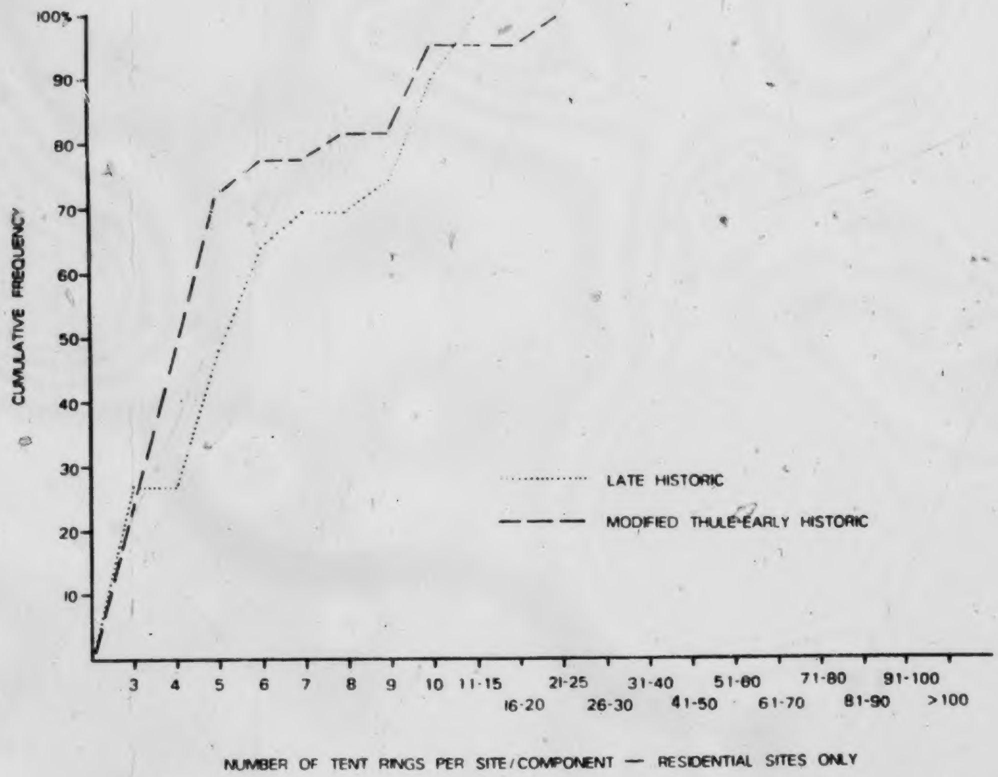

Figure 136. Comparison of frequencies of Modified Thule-early Historic and late Historic residential tent ring sites/components in the King William Island-Adelaide Peninsula area.

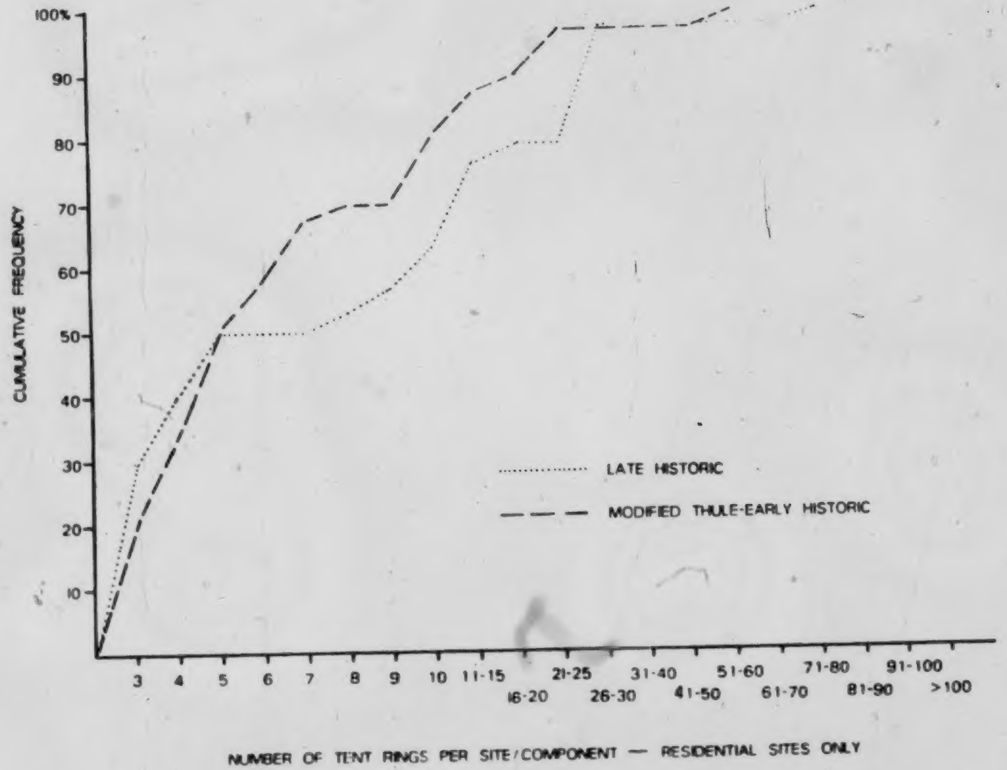

Figure 137. Comparison of frequencies of Modified Thule-early Historic and late Historic residential tent ring sites/components in the Lord Mayor Bay-Netsilik Lake area.

Thule-early Historic sites."

The characterization of the Modified Thule-early Historic subsistence strategies as that of "serial specialists" has been discussed previously. During the early Historic period, this serial specialization involved the hunting of caribou primarily during the late summer and early fall when the migrating herds were heading south (although small scattered groups were also occasionally hunted during the summer), seals during the winter and spring, using the ice as both a residential and hunting platform, and fish, although caught throughout much of the year, primarily during the mid-late summer river runs. Secondary resources included musk-oxen, fox, wolverine, hare, and ducks, geese, ptarmigan and other birds (Balikci 1964, 1984). As previously noted, this seasonal differentiation of a relatively wide variety of harvested species is reflected in the faunal material from the early Historic period (see Figure 117 and Table 13).

Although the recovered faunal remains from later sites suggests that the serial specialization was maintained to some extent during the late Historic period, there is a definite trend toward the late summer-fall hunting of sea mammals and the winter hunting of caribou (Figure 138 and Table 14). This corroborates Balikci's description of the changes in Netsilik hunting strategies following the introduction of the rifle:

> With rifles seals were more efficiently hunted at the ice edge or along wide ice cracks [while] in summer seals were shot in open water....[and further that] with rifles in hand the Netsilik could hunt caribou at any season and any place (1984:427).

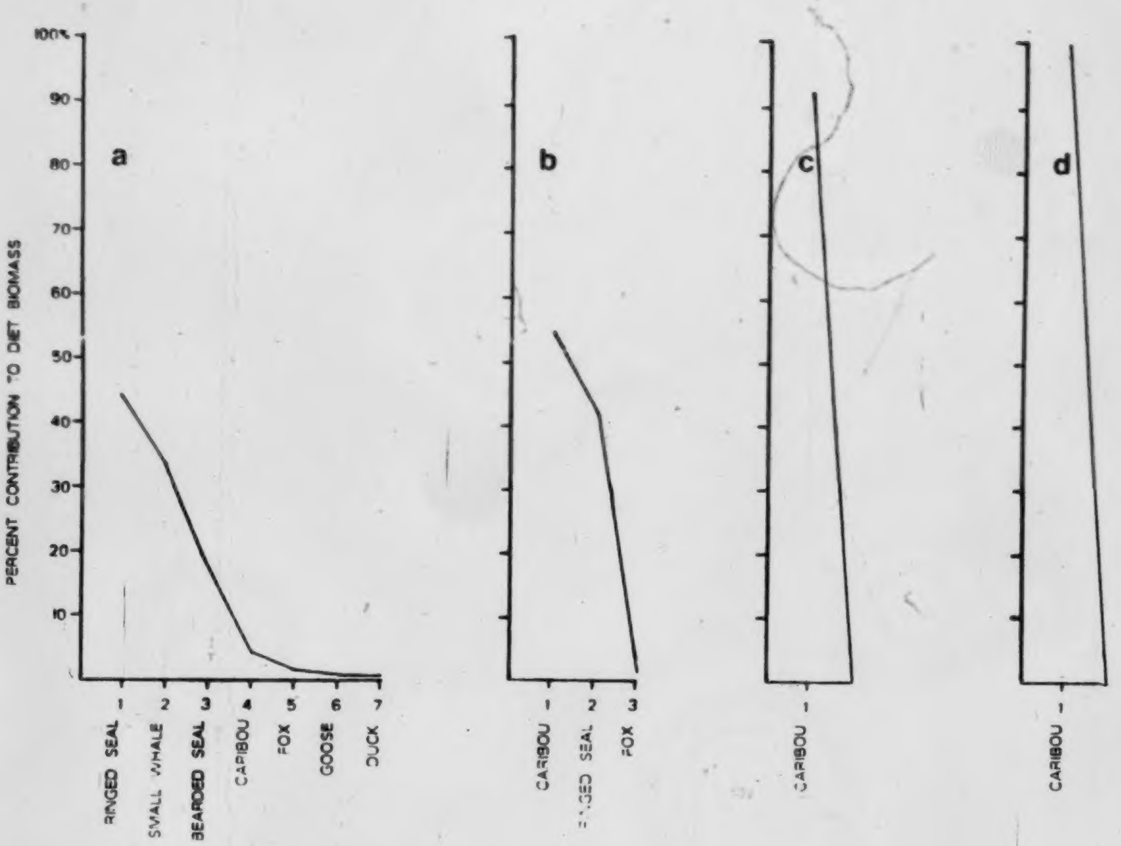

Figure 138. Percent contribution by weight to diet of fauna represented at the late Historic sites a) 81-81, two fall qarmang, b) 82-45, two snow dwelling scatters, c) 82-17a, one tent ring, and d) 82-19, one tent ring, all in the Lord Mayor Bay-Netsilik Lake area.

Table 14. Summary of Fauna MNI From Excavated Modified Thule-Early Historic Sites.

Site	Site Type	Caribou	Muskox	Canid	Fox	Hare	Polar Bear	Small Whale	Bearded Seal	Ringed Seal	Fish	Swan	Goose	Duck or Other Smaller Bird
82-21	1 Tent Ring	2												
82-22	2 Tent Rings	2												
82-24	1 'Heavy' Tent Ring	3			1	1					11		1	1
82-50	2 Tent Rings									1				
82-48	3 Snow dwelling scatters	1								3				
82-57	4 Tent Rings[1]				1					1	8			
82-70	3 Tent									2				

[1] - excludes fragmented and charred bone material in an external hearth associated with the site

This weakening of the serial specialization strategy was not, judging from the recovered faunal remains and Balikci's descriptions, accompanied by the predicted diet breadth reduction. Rather, the diet breadth would seem to have increased with the addition, at least in the Lord Mayor Bay area, of small whales and perhaps an increased emphasis on the large bearded seal.

Test Implication 9

> "High-bulk resources at late Historic residential sites should show progressively greater culling of low utility elements in comparison to those at Modified Thule and early Historic sites. This should not, however, be accompanied by a corresponding increase in medium-utility elements at caches and locations."

Dealing first with the second aspect of the test implication, that culling is reflected at cache and location sites, unfortunately no undisturbed or minimally disturbed late Historic caches or locations were examined, and therefore direct comparisons in this instance are not possible. Regarding the culling of low utility elements as reflected at residential sites, comparisons of caribou elements from an early Historic residential tent ring site in the Netsilik Lake area (site 82-24), and two late Historic residential sites, one a tent ring site at the Netsilik River (site 82-17a) and the other a snow dwelling site at Felix Harbour (site 82-45), are presented in Figure 139. As for the Classic Thule-Modified Thule/early Historic transition, the very small number of caribou represented at each of the respective

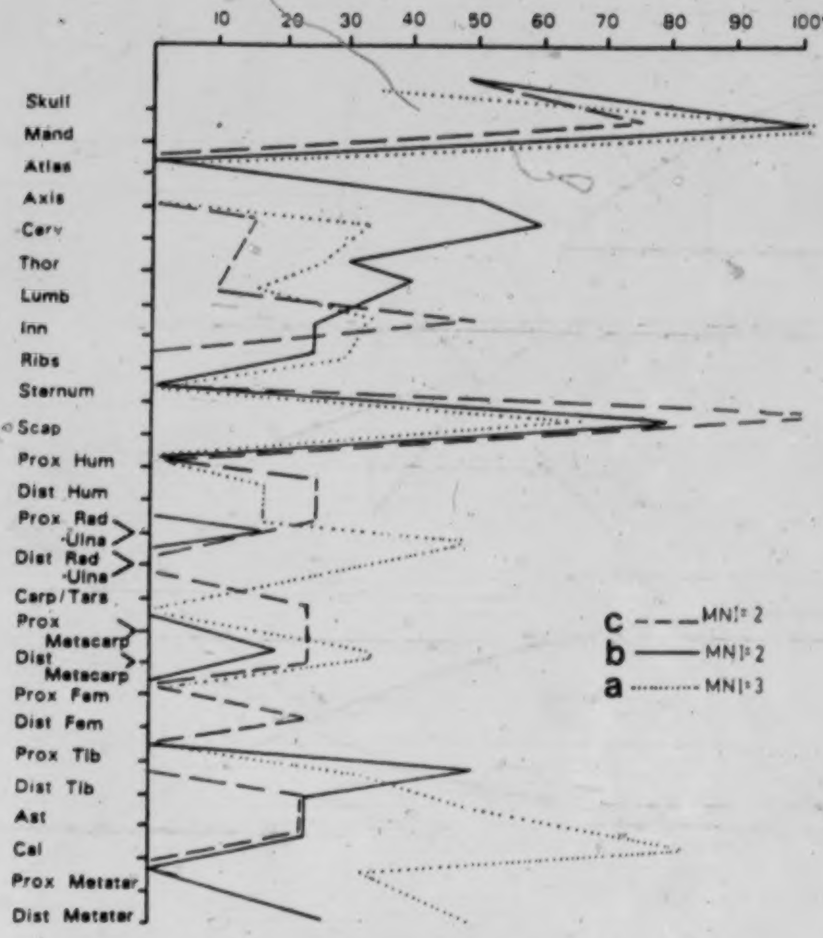

Figure 139. Relative elemental abundances for caribou from the early Historic site 82-24 (a), and the late Historic sites 82-17a (b), and 82-45 (c), all in the Lord Mayor Bay-Netsilik Lake area.

sites (i.e. MNI's of two or three) preclude a detailed analysis, although all three patterns are generally consistent with residential site patterns noted elsewhere (see e.g. Binford 1978a:327, 397, 440).

It is interesting to speculate, however, on one aspect of the elemental abundances, specifically those elements which show the greatest difference between the early Historic site and the two late Historic sites. These include the astragalus, calcaneous, proximal and distal metatarsals, and distal radio-cubitus, all of which are comparatively underrepresented at the late Historic period sites. All five elements have relatively low modified general utility indices, ranking 13th, 13th (tied), 17th, 19th, and 20th respectively (Binford 1978a:74), and thus offer some support of more radical culling during the late Historic period. However, these same elements have relatively high grease indices, ranked 11th, 4th, 5th, 19th, and 9th respectively (Binford 1978a:34). Since dogs typically prefer bones high in bone grease (White 1954; Binford 1978a), and since the number of dogs increased dramatically following the introduction of the rifle into the Netsilik area (from 1.5 to 3.5 per hunter: Balikci 1964:48), the elemental pattern may be reflecting this increase in addition to, or opposed to, more radical culling.

Test Implication 10

> "Faunal remains at late Historic residential sites associated with high-bulk resources should indicate relatively extended seasonal occupations, while those at Modified Thule and early Historic sites should indicate relatively short seasonal occupations."

As noted previously, no detailed dental annuli studies were undertaken for Modified Thule or early Historic period sites. However, the temporary nature of all features associated with these periods, and the average winter residential camp of one month duration (Kelly 1983:180-181) can be compared with summer and fall estimates respectively for season of death for a single ringed seal and a single caribou from the late Historic qarmang site at the Lord Lindsay River (site 81-81), suggesting a tendency toward increased duration of site occupation.

CHAPTER TEN:

SUMMARY OF RESULTS AND MODEL EVALUATION

HYPOTHESIS 1:

> A decrease in the distribution and abundance of bowhead whales in the northern part of the study area, and in barren ground caribou in the southern part of the study area, will be accompanied by a transformation of subsistence-settlement systems based primarily on collecting strategies to subsistence-settlement systems based primarily on foraging strategies.

The overall results of the test implications of Hypothesis 1 are summarized in Table 15. The predicted trends are subjectively classified as being strongly developed (SD), weakly developed (WD), not present (no change - unless no change was predicted) (NC), or opposite (OP). Implications for which data were not recovered or could not otherwise be determined are classified as those with insufficient data (ID). In some instances it was possible and/or necessary to compare the trends through only the initial part of the transition (i.e. early Classic to late Classic Thule) and these are indicated accordingly.

The strongest confirmation of the hypothesis is in the northern whaling area, for which the predicted trends in seven of the ten test implications are strongly developed (Implications 1, 3-8), one exhibited no change (Implication 2), while data were not available for

Table 15. Summary of Results of Hypothesis No. 1 Test Implications.

Test Implication No. and Description	Somerset Island			King William Island			Boothia-Netsilik		
	ECT	LCT	MT/EH	ECT	LCT	MT/EH	ECT	LCT	MT/EH
1. Decreasing functional separation of sites	SD				SD			WD	
2. Decreasing intersite variability as reflected by cache/tent ring ratio	NC				SD			NC	
3. Decrease in recognizable foraging and logistical zone separation	SD				SD			NC	
4. Shift from site placement patterns related to primary resources to patterns related to secondary resources.	SD			SD	SD			WD	
5. Decreasing residential site permanency	SD			SD	SD			WD	
6. Decrease in internal site structure	SD			WD			NC	NC	
7. Decrease in residential site size	SD (W) SD (S)			WD	OP (W) SD (S)		WD	OP (W) NC (S)	

Table 15. Continued.

Test Implication No. and Description	Somerset Island			King William Island			Boothia-Netsilik		
	ECT	LCT	MT/EH	ECT	LCT	MT/EH	ECT	LCT	MT/EH
8. Increase in diet breadth		SD			WD				NC
9. Decrease in culling of low utility elements		ID			SD			ID	ID
10. Shortening of multi-seasonal occupations		ID			WD			WD	NC

SD=Strongly developed; WD=Weakly developed; NC=No change; ID=Insufficient Data; OP=Opposite; (W)=Winter; (S)=Summer.

the non-whale culling strategies or the seasonality estimates (Implications 9, 10). In the southern caribou region, confirmation of the hypothesis was almost as strong for the King William Island-Adelaide Peninsula region, with predicted trends being strongly developed for six of the ten test implications (Implications 1-5, 9), weakly developed for three, (Implications 6, 8, 10), and for one, residential group size (Implication 7), weakly developed for early-late Classic Thule winter group size transition, strongly developed for the total Classic Thule-Modified Thule/early Historic spring-fall residential group size, and opposite for late Classic Thule-Modified Thule/early Historic winter residential group size.

The model was a relatively poor predictor, on the other hand, for the Lord Mayor Bay region, for which the predicted trend was strongly developed for only one of the ten test implications (Implication 5), weakly developed for two (Implications 1, 4), and parts of two others (Implications 7 and 10), no change for four (Implications 2, 3, 6, 8), and parts of two others (7 and 10), and opposite for part of one (Implication 7). Data were insufficient for determining trends in culling practices (Implication 9).

The surprisingly large discrepancy in the overall results obtained from the northern whale area and the King William Island-Adelaide Peninsula region of the southern caribou region on the one hand, and the Lord Mayor Bay-Netsilik Lake region on the other hand, suggests an invalid assumption regarding the resource base change in the latter area rather than any intrinsic inadequacy of the model itself. Specifically, the similarities between the Classic Thule and Modified Thule/early Historic patterns, and the tendency of these strategies to more closely approximate foraging rather than collecting systems, suggests that the abundance and/or predictability of caribou, and thus the security of the resource, was not as great as assumed. There are no reliable estimates of the abundance of caribou that might have been migrating across the Boothia Isthmus, but the apparently large number that occurred during the Historic period suggests that under even more favourable calving condition abundance per se would not have been a limiting factor. The second aspect related to resource security, however, is the predictability of mobile, but seasonal aggregates. In the case of caribou, it was noted that during the early Historic period Crescent Harbour in Sherman Inlet, the narrows of Simpson Strait, and the Netsilik River-Netsilik Lake areas served as the primary crossing localities. In Rasmussen's (1931:91-113) Netsilik Eskimo Topography, only one fall migration is indicated on the entire Simpson Strait coast (the narrows), and one on Sherman Inlet (Crescent Harbour). At Netsilik River-Netsilik Lake and environs, however, nineteen fall crossings are indicated. Accordingly, while fall caribou interception on King William Island and at Sherman Inlet was highly predictable, it is probable that it was much less so on Boothia Peninsula, to the point that well-developed collecting strategies were not possible (c.f. Burch 1972:359). In this regard, it is significant that despite an orientation toward a foraging strategy during the Classic Thule in the Lord mayor Bay area, true 'heavy' semi-subterranean dwellings with true cold trap-entrances were utilized. This may indicate that, at least at the local level, dwelling features were not as sensitive to adaptive strategy change as they were to overall material culture change.

Finally, in the King William Island-Adelaide Peninsula region, late Classic winter residential site sizes indicate considerably smaller population levels than both early Classic Thule winter residential sites (predicted) and later ethnographically documented early Historic winter residential groups (not predicted). This apparent sharp population decrease during the late Classic Thule period can best be explained by the predicted shift in the role of caribou vs. seal in the subsistence economy. That is, as caribou began to play a less important role, smaller winter villages were located away from the caribou crossing areas and closer to the primary seal areas, with members of individual settlements probably co-operating in sea ice-based mid-winter seal hunting. Accordingly, maximum population aggregation would not be archaeologically recognizable, and the population decrease may be more apparent than real. A similar argument can be advanced for the Lord Mayor Bay-Netsilik Lake region, although here it is probable that mid-winter aggregation took place during both early and late Classic Thule periods.

HYPOTHESIS 2:

> The introduction of the rifle will be accompanied by a transformation of a subsistence-settlement system based on a foraging strategy to a subsistence-settlement system based on a collecting strategy, but one which lacks specialized procurement techniques.

The overall results of the test implications for Hypothesis 2 are presented in Table 16 with the predicted trends subjectively classified as was done for Hypothesis 1.

For the King William Island-Adelaide Peninsula region, predicted trends for one of the ten test implications was strongly developed (Implication 3), three were weakly developed (Implications 1, 4, 7), there was no apparent change in two (Implications 2, 5,), and insufficient data for the remaining four (Implications 6, 8, 9, 10). For the Lord Mayor Bay-Netsilik Lake area, predicted trends for three of the ten test implications were strongly developed (Implications 3, 6, 7), five were weakly developed (Implications 1, 4, 5, 9, 10), there was no apparent change in one (Implication 2), while one was opposite (Implication 8).

Certainly the most critical of the failed test implications is that dealing with diet breadth (Implication 8), an apparent increase, at least in the Lord Mayor Bay region, in contrast to the predicted decrease. These results are also inconsistent with the "empirically observed" post-rifle Netsilik Inuit economy described by Keene (1979), and with the linear programming model he developed (op. cit.).

The most plausible explanation for this discrepancy, and certainly one which is still consistent with the model, is that the introduction of the rifle contributed to the depletion of migratory caribou herds early during the late Historic period to the point where they were very quickly relegated to a secondary resource through greatly increased search time. That rapid decimation of caribou herds took place has been well documented:

> We saw the first great herd of caribou coming trotting down over the hills [at Simpson Strait]...All the men siezed their guns and bags, and a moment later they lay concealed here and

Table 16. Summary of Results of Hypothesis No. 2 Test Implications.

Test Implication No. and description	King William Island	Boothia-Netsilik
	MT/EH LH	MT/EH LH
1. Increasing functional separation of sites	WD	WD
2. Increasing intersite variability as reflected by cache:tent ring ratio	NC	NC
3. Increase in recognizable foraging and logistical zones	SD	SD
4. Shift from site placement patterns related to secondary resources to patterns related to primary resources	WD	WD
5. Increasing residential site permanency	NC	WD
6. No change in internal site structure	ID	SD (i.e. no change)
7. Increase in residential site size	ID (W) WD (S)	ID (W) SD (S)
8. Decrease in diet breadth	ID	OP
9. Increase in culling of low utility elements	ID	WD
10. Lengthening of seasonal occupations	ID	WD

SD=Strongly developed; WD=Weakly Developed; NC=No change; ID=Insufficient Data; OP=Opposite; (W)=Winter; (S)=Summer.

> there...This was the first real massacre of that autumn...shot after shot cracked, animal after animal tumbled over...until the whole cavalcade split up...and galloped back to the interior of the island. (Rasmussen 1931:78).

> ...once massive migrations of barren-ground caribou wintering at or near the tree line and invading in spring the Boothia Peninsula area ceased in the years between 1920 and 1930. The main factor behind this drastic change in caribou distribution was the regular supply of arms and ammunition to the Eskimos...(Balikci 1964:51).

Accordingly, an increased focus on seals and other large mammals (including small whales when available) can be predicted. The temporal divisions used in the present study are relatively "coarse-grained" and do not allow for subdivisions within the late Historic period. However, a detailed comparison of immediate post-rifle (1920-1930) with later post-rifle strategies, should indicate a short-lived, but nevertheless restricted and intense caribou-seal economic strategy. Caribou herd decimation also explains the relative lack of residential and other site types at major caribou crossing localities in both the King William Island-Adelaide Peninsula and Lord Mayor Bay-Netsilik Lake areas.

The model of subsistence-settlement strategies as developed and applied in this study is not mathematically rigorous. Instead, emphasis has been placed on the logical development of expectations of hunter-gatherer behavior in terms of relative degree and direction of responses to a) a change in resource structure, and b) a change in technology. Given the probable circumstances leading to each of the incongruencies between the expectations and the recovered data, the results suggest that the model is a useful tool in the development of a greater understanding of the ecological context of hunter-gatherer behavior. While it deals with one aspect only - mobility - it demonstrates that varying organizational mixes of the two defined types of mobility, residential and logistical, result in substantially different archaeological "signatures" in the form of settlement patterns and faunal characteristics. Furthermore, the recognition of such mixes allows a better understanding of change in long-term land use. In the northern whale area, for example, short-term perturbations in whale abundance or distribution due to occasional severe summer ice conditions would result in short-term shifts to foraging strategies. This in turn would result in a different archaeological pattern than the collecting strategy employed during successful whaling years. Over a long time period, however, the "palimpsest" effect would diminish, but not entirely cover, the foraging pattern. Accordingly, it is by tracking the direction of the trends in the archaeological variability, as attempted in the present study, that organizational responses to resource fluctuations and/or changes can be determined.

Implications for Arctic Archaeology

Fluctuations in the resource base of arctic hunter-gatherers have long been recognized as a critical variable in the explanation of the arctic archaeological record (e.g. Giddings 1961; Taylor 1966; McGhee 1970, 1972; McCartney 1977; Dekin 1972; Fitzhugh 1972, 1976; Arundale 1976, 1980; Schledermann 1976a, 1976b; Maxwell 1979), and it is only rarely that reported research does not in some manner subscribe to the opinion that an understanding of hunter-gatherer adaptation and response to environmental conditions are central to arctic archaeology's goals. Furthermore, as an archaeological laboratory the Arctic is in many respects unique. There are few, if any, regions elsewhere where material remains are as visible, as well preserved, or as relatively free of natural and cultural post-depositional destruction. In addition, an excellent data base allows direct extrapolation of a number of aspects of ethnographic behavior to the prehistoric inhabitants. Finally, the extreme nature of the climate and consequent constraints on the nature of the various resource bases allow the definition of relevant environmental variables unequalled in most other areas.

It is somewhat paradoxical, on the other hand, that while ethnohistorical, ethnographical, and ethnoarchaeological research which focuses in whole or in part on historical and modern arctic hunter-gatherers, has served, and continues to serve, in the development of general models of hunter-gatherer adaptation and culture change (e.g. Service 1962; Sahlins 1972; Binford 1978a,b, 1980; Smith 1981, 1983; Riches 1982; Hickey 1984), for the most part Arctic archaeologists have been reluctant to apply these models in the very area where they would be most applicable. The present study demonstrates that such models are applicable to prehistoric (and historic) Arctic cultural sequences. In this case, the examination of the archaeological record from the perspective of predicted "signatures" of hunter-gatherer mobility strategies serves not only as a useful test of the models of adaptation based on such strategies, but also, by corollary, as a test of several assumptions made by Arctic archaeologists (for example, that Thule Eskimos were active whale hunters as opposed to whale carcass scavengers, or that Thule

Eskimo societies were universally omniverous - see esp. Taylor 1966; Freeman 1979; McCartney 1980).

In addition to illustrating the potential of appropriate models for investigating Thule Eskimo adaptative strategies, the study also points to several traditional weaknesses of Thule archaeology.

First, and perhaps most importantly, it has shown that the data recovered from the traditional excavation of single winter residential sites are not sufficient to fully evaluate the type and degree of adaptation to a given resource base, or to changes in that resource base. Instead, such investigations require the integration of these data with comparable and ancillary data from other site types. This in turn requires a region as opposed to a site-specific approach and concomitant definition and justification of survey regions and survey methods.

Second, the necessity of dealing with other than winter residential sites, which are typically the largest and richest, requires that "non-traditional" dating methods be given greater emphasis. While the study of lichen characteristics presented here has proven promising, it is nevertheless a "coarse-grained" initial attempt, and its application elsewhere, and more extensive and controlled application within the study area, remain to be demonstrated. In this regard, harpoon heads, while, as noted previously, one of the few recognized temporally-sensitive artifacts, are obviously of utility only if present. However, few, if any, can be expected at non-sealing summer-fall camps, and perhaps more importantly, few if any can be expected at "winter" residential sites associated with "caribou-collecting" strategies. In the southern caribou region, for example, there were few recovered in comparison with High Arctic Thule sites, and there were none recovered from the winter residential sites at Sherman Inlet and Netsilik River.

Third, the study illustrates the potential value of data derived from ethnoarchaeological studies, which, although of increasing importance in archaeological and anthropological theory (see e.g. Yellen 1977; Gifford 1978, 1980; Kramer, 1979; Binford 1978a, 1978b, 1980; Gould 1978, 1980), has only recently been recognized and applied in northern Canadian archaeology (see e.g. Janes 1983; Hanks 1983; Savelle 1984).

Fourth, and as previously demonstrated by Binford (1976), the examination of "acculturated" Historic Inuit groups need not be considered from the perspective of cultures in decline, but instead they can be considered from the perspective of groups adapting to changes in critical resources, whether these changes are determined by technology, resource structure, or differing economic systems.

In discussing the traditional cultural-historical emphasis of Thule archaeological studies, McCartney recently observed that

> A second phase of Thule research is fast approaching wherein study of settlement patterns, adaptive strategies, demography, and carrying capacity, to name only a few foci, will require us to broaden our perspective to summer and fall seasonal camps and other small sites marked by surface features only. Accordingly a sensitive methodology must be developed to cover such expanded research (1980:537).

While the present study is in several respects an attempt to initiate the development of such a "sensitive methodology", it also outlines the necessity of developing such a methodology within an explicit theoretical framework.

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Plate 1

a) Ringed seals at the present residential camp of Kuvinaluk, Union River, Somerset Island. July 1980.

b) Processing caribou at a kill site in the Thom Bay Region of Lord Mayor Bay, Boothia Peninsula. August 1981. See also Figure 23.

Plate 2

a) Steatite quarry, Lord Mayor Bay (Site 82-35) utilized at least during late Historic and Recent times.

b) Remains of a DC-3 that crashed on northern Boothia Peninsula in 1947. Material from the aircraft was utilized extensively by local Inuit during the succeeding approximately two decades.

Plate 3

a) Remains of a beluga whale at a processing site near Kuvinaluk, Union River, Somerset Island. July 1980.

b) Stone fish weir on the Stanley River near Thom Bay in the Lord Mayor Bay area of Boothia Peninsula. August 1981. See also Figure 23.

Plate 4

a) Constructing fish weir on the Stanley River near Thom Bay in the Lord Mayor Bay area of Boothia Peninsula. August 1981. See also Plate 3b and Figure 23.

b) Location of fish weir shown in Plates 3b and 4a approximately one year later. Almost nothing remains of the original weir. August 1982.

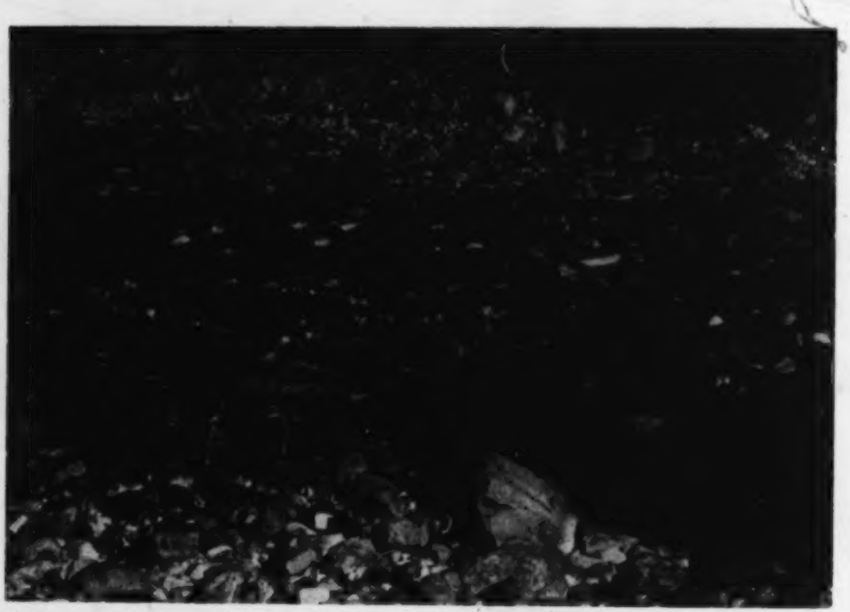

Plate 5

a) Caribou observation site near Thom Bay in the Lord Mayor Bay area of Boothia Peninsula. August 1981. See also Figure 23.

b) Above-ground stone cache containing 29 Arctic char prior to the final covering stone layer. August 1981. See also Figure 23.

Plate 6

a) Above-ground cache of caribou at Sherman Inlet, Adelaide Peninsula. The meat portions are wrapped in the hide, onto which is placed the skull. July 1982.

b) Large tent ring interpreted as a possible karigi at Classic Thule residential site 80-107 near Creswell Bay, Somerset Island.

Plate 7

a) 'Heavy' semisubterranean stone/sod/whale bone dwelling at site 80-86, Creswell Bay, Somerset Island.

b) 'Light' semisubterranean stone/sod dwelling at site 81-52, King William Island.

Plate 8

a) Remains (foreground) of gravel sleeping platform insulation layer and artifacts and faunal remains associated with snow dwelling at site 82-45, Felix Harbour, Lord Mayor Bay. The remains associated with a second snow dwelling feature are visible in the center middle-ground.

b) Semisubterranean dwelling interpreted as a possible karigi at site 80-93, Creswell Bay, Somerset Islnd.

Plate 9

a) 'Heavy' semisubterranean dwelling interpreted as possible karigi at site 82-11, Sherman Inlet, Adelaide Peninsula.

b) Circular ring of ten bowhead whale crania at site 80-86, Creswell Bay, Somerset Island.

Plate 10

a) Bowhead whale crania (Site 80-53) showing artificial perforations immediately anterior of the foramen magnum. Creswell Bay, Somerset Island.

b) Caribou drive system consisting of intricate fence-corral network, site 82-12, Sherman Inlet, Adelaide Peninsula.

Plate 11

a) Circular gravel caches, Creswell Bay, Somerset Island (Site 80-92).

b) Part of the remains of the Victory's engine (Site 80-51), abandoned in 1830 at Felix Harbour, Lord Mayor Bay, Boothia Peninsula. Fragments of the engine and related material are common in early and late Historic sites throughout the Netsilik area.

Plate 12

a) Inuit canvas tent (right) and the field crew's tent (left) at the mouth of the Stanley River in the Lord Mayor Bay area, Boothia Peninsula. August 1981. See also Figure 23.

b) Cached seal (center ground) in cache constructed of tent "hold-down" stones at the original tent location and immediately following the dismantling of the tent. August 1981. See also Figure 23.